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Second Review



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FOREWORD

The second Environmental Performance Review (EPR) of Morocco builds on the substantial experience accumulated by the United Nations Economic Commission for Europe (ECE) and its member States in using the EPR tool to regularly assess progress achieved in reconciling national economic and environmental objectives. Over a quarter of a century, EPRs have resulted in: stronger institutions for environmental governance, management and performance; improved financial frameworks for environmental protection; advanced environmental monitoring and information systems; better integration of environmental concerns into sectoral policies; strengthened public participation; enhanced environmental awareness; and increased international cooperation. EPRs bring together good practices and a wealth of experience from all ECE member States in a mutually enriching learning exchange.

Overall, Morocco advanced well in setting the conditions necessary for implementing the 2030 Agenda for Sustainable Development. Since the first review, Morocco has put in place a comprehensive policy framework with, as its foundation, the 2011 National Charter for the Environment and Sustainable Development, enacted in legislation in 2014, and the National Sustainable Development Strategy adopted in 2017. Morocco established cross-sectoral governance and institutional structures, notably the National Commission on Sustainable Development and the Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development. The country has updated its environmental legislation by adopting several new laws and amending existing legislation. The environmental policy framework was also updated. The country launched several initiatives to promote green jobs and green companies.

Priority issues requiring further attention by Morocco, as identified in the EPR, include: the promotion of sustainable development and support of the cross-cutting work of the Department of Sustainable Development; the reinforcement and acceleration of the development of secondary legislation to operationalize the environmental legal framework; the strengthening of the environmental impact assessment mechanism; the boosting of strategic planning and implementation efforts to address coastal erosion, flooding and biodiversity loss; ensuring meaningful public participation in decision-making on environmental matters; the enhancement of open access to environmental information; and enabling waste recovery and augmenting waste recycling at source. Moreover, the presence of lead in humans, especially children, and the use of asbestos as a building material have been identified by the second EPR as areas that must be addressed as a priority.

I would like to highlight the richness of the second EPR of Morocco, addressing 93 Sustainable Development Goal (SDG) targets and making 105 recommendations. I trust that this review will serve as a powerful tool to support decision makers and policymakers as well as representatives of civil society in their efforts to improve environmental governance, management and performance and achieve the SDGs in Morocco.

ECE wishes the Government of Morocco further success in carrying out the tasks involved in meeting its environmental objectives, including through the implementation of the recommendations in the second review. I also hope that the lessons learned from the peer review process in Morocco will benefit other countries in the ECE region and beyond.



Ms. Olga Algayerova
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PREFACE

The second EPR of Morocco takes stock of progress made in the governance and management of the environment since the first review in 2014, assesses the implementation of the recommendations of that EPR and makes new recommendations for the country to implement. In addition, the second EPR looks into developments related to the country's attainment of relevant targets of the 2030 Agenda for Sustainable Development.

The review covers legal and policy frameworks and compliance assurance mechanisms. It also focuses on greening the economy, environmental information, monitoring and assessment, environmental democracy and education for sustainable development. At the domestic–international interface, it includes a substantive analysis of the country's participation in and commitments to international agreements. Climate change issues are addressed in relevant chapters across the EPR. The EPR also examines the efforts of Morocco to integrate environmental considerations into its policies in the energy, agriculture, industry and health sectors. Furthermore, the EPR addresses issues of specific importance to Morocco related to air protection, water management, waste and chemicals management, biodiversity and protected areas and coastal zone management. Finally, the review includes an assessment of 93 SDG targets, including 32 targets being reviewed in several chapters from different perspectives. In some cases, a comprehensive analysis of SDGs and targets is hindered by the lack of data and information.

The second EPR of Morocco began in November 2020 with an online preparatory mission to agree on the structure of the report and the schedule for its completion. A team of international experts took part in the online review mission from November 2020 to February 2021. An update country review mission took place in person in October 2021. During its online meeting on 27–29 September 2021, the ECE Expert Group on Environmental Performance Reviews discussed the draft report with a delegation from Morocco, focusing on the conclusions and recommendations made by the international experts. The recommendations, with suggested amendments from the Expert Group, were then submitted for peer review to the ECE Committee on Environmental Policy at its twenty-seventh session on 3–5 November 2021, which was attended by a delegate from Morocco. The Committee adopted the EPR recommendations.

The Committee and the ECE secretariat are grateful to the Government of Morocco and its experts who worked with the international experts and contributed their knowledge and expertise. ECE would also like to express its deep appreciation to the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection and the German Federal Environment Agency for their support by providing funds through the Advisory Assistance Programme for their financial support to this review.

Sincere thanks also go to France, Hungary, Italy and Luxembourg and the European Investment Bank for having provided their experts to this review.

In addition, ECE takes this opportunity to thank Austria, Germany and Switzerland for their financial support to the EPR Programme and expresses its deep appreciation to Estonia, Georgia, Germany, Hungary, Italy, Montenegro and Switzerland for having provided their experts for the ECE Expert Group on Environmental Performance Reviews, which undertook the expert review of this report.



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ECE COMMITTEE ON ENVIRONMENTAL POLICY PEER REVIEWS THE ENVIRONMENTAL PERFORMANCE OF MOROCCO

At its twenty-seventh session (Geneva, 3–5 November 2021), the ECE Committee on Environmental Policy peer reviewed the environmental performance of Morocco and adopted the recommendations contained in the second EPR of Morocco.¹

Excerpt from the Report of the Committee on Environmental Policy on its twenty-seventh session

The Committee proceeded with the peer review of the Second Environmental Performance Review of Morocco. The review's 16 chapters and associated recommendations (information paper No. 7) had earlier been examined by the ECE Expert Group on Environmental Performance Reviews together with Moroccan experts at a meeting conducted in a hybrid format in Geneva and by virtual means from 27 to 29 September 2021.

Ms. Farah Bourqartacha (Head, Directorate of Observation, Studies and Planning, Department of Sustainable Development, Ministry of Energy Transition and Sustainable Development of Morocco) presented key achievements to date and main challenges encountered by the country in advancing the environmental agenda for sustainable development, within the substantive framework of the second environmental performance review of the country.

The Chair of the Expert Group on Environmental Performance Reviews (Estonia) informed the Committee on Environmental Policy of the main outcomes of the Expert Group's work in 2021, highlighting the richness of the Second Environmental Performance Review of Morocco, which contained 105 recommendations and addressed 76 targets of the Sustainable Development Goals. He also emphasized the constraints of virtual meetings, while recognizing the positive aspect of enabling a broader participation of experts from the reviewed country.

The rapporteurs designated by the Expert Group on Environmental Performance Reviews (Italy and Switzerland) shared key findings in selected areas of the second review and the steps necessary to address the identified challenges.

The Committee adopted the recommendations contained in the Second Environmental Performance Review of Morocco.

¹ The Report of the Committee on Environmental Policy on its twenty-seventh session (ECE/CEP/2021/2) is available on the ECE website at: <https://unece.org/info/Environmental-Policy/Committee-on-Environmental-Policy/events/357297>.

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Photos on the cover from left to right and top to bottom:

Morocco's participation in UNEA, 2022

Ouarzazate Solar Power Station, Drâa-Tafilalet Region

Wind farm, Koudiat El beida, Tangier-Tétouan-Al Hoceima Region

Greater flamingo (*Phoenicopterus roseus*), Souss Massa National Park

Idriss 1st Dam, Taounate Province, Fes-Meknes Region

Photo credits: Sustainable Development Department

KEY ABBREVIATIONS AND ACRONYMS

ABH	water basin agency
AFD	French Development Agency
AMEE	Moroccan Agency for Energy Efficiency
AMMC	Moroccan Capital Markets Authority
AMSSNuR	Moroccan Agency for Nuclear and Radiological Safety and Security
ANDZOA	National Agency for the Development of Oasis and Argan Zones
ANRE	National Authority for Electricity Regulation
BAU	business as usual
BCH	Municipal Hygiene Office
CAPM	Poison Control and Pharmacovigilance Centre of Morocco
CBD	Convention on Biological Diversity
CGEM	General Confederation of Moroccan Enterprises
CEV	Landfill and recovery centres
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNEDD	National Charter for the Environment and Sustainable Development
CNEE	National Commission for Environmental Assessment
CNESTEN	National Centre for Nuclear Energy, Science and Technology
CRUI	Unified Regional Investment Commission
CSR	Corporate social responsibility
DGE	General Directorate for Water
DGM	General Directorate of Meteorology
DRE	Regional Environment Directorate
EBRD	European Bank for Reconstruction and Development
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPR	Environmental Performance Review
ESD	education for sustainable development
FAO	Food and Agriculture Organization of the United Nations
FNEDD	National Environmental Protection and Sustainable Development Fund
FODEP	Fund for Industrial Depollution
GCF	Green Climate Fund
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GDIV	General Discharge Limit Value
GELV	General Emission Limit Value
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMO	Genetically modified organisms
HACCP	Hazard analysis and critical control points
HCP	High Commission for Planning
ICRAM	Joint initiative for strengthening the advancement of Moroccan women
IEA	International Energy Agency
ILO	International Labour Organization
IMO	International Maritime Organization
INDH	National Initiative for Human Development
INH	National Institute of Hygiene
INRA	National Institute of Agronomic Research
INRH	National Fisheries Research Institute
IRESEN	Research Institute for Solar and New Energies
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
IVM	integrated vector management
IWRM	integrated water resources management
KfW	German Agency for Financial Cooperation

LNESP	National Laboratory for Pollution Studies and Monitoring
LPEE	Public Laboratory for Tests and Studies
MASEN	Moroccan Agency for Solar Energy
MEA	Multilateral Environmental Agreement
MEDPOL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean
MPA	marine protected area
MPW	medical and pharmaceutical waste
NBSAP	National Biodiversity Strategy and Action Plan 2016–2020
NCD	Non-communicable diseases
NDC	Nationally Determined Contribution
NGO	non-governmental organization
NM	Moroccan norm
OCP	Cherifien Office of Phosphate
ONEDD	National Observatory of the Environment and Sustainable Development
ONEE	National Office of Electricity and Drinking Water
ONSSA	National Office of Food Safety
OREDD	Regional Observatory of the Environment and Sustainable Development
PANLCD	National Action Programme to Combat Desertification
PCN	National Climate Plan for the period to 2030
PDAIRE	Master Plan for Integrated Water Resources Management
PMDEER	National Programme of Environmental Upgrading of Rural Schools and Mosques
PMV	Green Morocco Plan
PNACE	National Annual Environmental Control Plan
PNAEPI	National Drinking Water Supply and Irrigation Programme
PNAir	National Air Programme for the period 2018–2030
PNAM	National Shared Sanitation Programme
PNDM	National Household Waste Programme
PNDMP	National programme for the management of medical and pharmaceutical waste
PNE	National Water Plan
PNEII	National Programme for Saving Irrigation Water
PNL	National Integrated Coastal Zone Management Plan
PNSQA	National Air Quality Monitoring Programme
PNVD	National Programme for Waste Recovery
POP	persistent organic pollutant
RBA	river basin administration
SBEI	Sites of Biological and Ecological Interest
SDG	Sustainable Development Goal
SDLV	Specific Discharge Limit Value
SEA	strategic environmental assessment
SELV	Specific Emission Limit Value
SEIS	Shared Environmental Information System
SIE	Energy Investment Company
SIREDD	Regional Environmental and Sustainable Development Information System
SME	small and medium-sized enterprise
SNDD	National Sustainable Development Strategy
SOER	Report on the State of the Environment
UAA	useful agricultural area
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Organization
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VNR	Voluntary National Review
WHO	World Health Organization
WWF	World Wide Fund for Nature
WWTP	wastewater treatment plant

SIGNS AND MEASURES

..	not available
-	nil or negligible
°C	Degree Celsius
µg/m ³	microgram/cubic metre
€	euro
eq.	equivalent
Gg	Gigagram
GWh	gigawatt-hour
ha	hectare
kg	kilogram
km	kilometre
km ²	square kilometre
kt	kiloton
ktoe	kiloton of oil equivalent
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	metre
m ²	square metre
m ³	cubic metre
mg	milligram
Mg	megagram
mm	millimetre
MW	megawatt
MWh	megawatt-hour
n.d.	no data
Nm ³	Normal cubic metre
t	ton (1,000 kg)
US\$	United States dollar
y	year

CURRENCY CONVERSION

Exchange rate (period average)

Year	Dirham/US\$
2011	8.09
2012	8.63
2013	8.41
2014	8.41
2015	9.76
2016	9.81
2017	9.69
2018	9.39
2019	9.62
2020	9.50
2021	8.99

Source: World Bank Database (accessed 1 June 2022).

Executive summary

Sustainable Development Goals

Morocco adopted the National Sustainable Development Strategy (SNDD) in 2017 through a multistakeholder comprehensive consultation process which began in 2013. The SNDD sets out seven priority issues, 31 strategic directions and 137 goals. However, given that the preparation of the SNDD started in 2013, it is not perfectly aligned with the Sustainable Development Goals (SDGs). Accordingly, an evaluation of the SNDD is on-going with the aim of aligning its goals with the SDGs.

The main institutional framework for sustainable development is established in Morocco. The National Commission on Sustainable Development provides a permanent institutional framework for the 2030 Agenda and is chaired by the Head of Government and attended by ministers. A Committee for Monitoring and Support of the Sustainable Development Goals is established within the National Commission on Sustainable Development and is also chaired by the Head of Government. The elaboration of the Voluntary National Reviews (VNR) on the SDGs is done by the High Commission for Planning (HCP).

The HCP has established an online platform dedicated to the SDGs. The site provides data to contextualise the SDG targets and indicators at the national level and contains the quantified indicators of these goals, metadata and access to the database that provides data at the national level. *Efforts are also under way to harmonize national and regional monitoring platforms on measuring and monitoring sustainable development*

In 2020, Morocco issued its second VNR of implementation of the SDGs. The HCP handles data collection and coordination for the VNR, as well as official reporting of SDG implementation. The draft VNR was debated by the National Commission on Sustainable Development with consultation of civil society before adoption by the Government.

Morocco has not nationalized the SDGs, though relevant SDG indicators have been selected. In 2019, the then Department of the Environment published a study on the implementation and monitoring of SDGs which resulted in the retention of 149 SDG targets prioritized according to four levels.

Morocco carries out activities to raise awareness of the SDGs in all areas of society. Between 2017 and 2019, the HCP organised three regional consultations in collaboration with the wilayas and regional councils to increase awareness and ownership of the SDGs by actors at local level. Consultations for the preparation of the VNR involved civil society and included surveys of businesses and households to assess the social and economic impact of the Covid 19 pandemic in Morocco. Ministerial departments also exchange information and raise awareness between departments on the SDGs.

Legal, policy and institutional framework

In Morocco, the legal system combines civil and Muslim law. The King exercises his powers by dahir, by which he may legislate by decree as well as promulgate laws passed by the bicameral parliament, and parliament holds the remaining legislative powers. Further, parliament may vote on framework laws concerning the fundamental objectives of the economic, social, environmental and cultural activity of the State.

The National Charter for the Environment and Sustainable Development (CNEDD) and the SNDD provide clear legislative development and strong policy foundations. Some new media-specific and horizontal legislation has also been adopted or reinforced, though implementing regulations lag behind. Several new laws are being prepared and gaps are being reviewed.

Since 2015, Morocco has begun to overhaul and update its national legal framework for the environment and sustainable development, in accordance with the provisions of the framework law No. 99-12 on the national charter and sustainable development. For example, the Law on Water, No. 10-95 was repealed by the Law No. 36-15 and Law on Environmental Impact Assessment (No. 12-03) was replaced by the Law on Environmental

Assessment No. 49-17. New laws on waste, climate change, and access to genetic resources and the fair and equitable sharing of the benefits arising from their use are being developed or published.

Morocco adopted a Law on Environmental Assessment in 2020. The new Law obliges draft policies, programmes, strategies and sectoral and regional plans drawn up by the State, local authorities and public establishments to be subject to Strategic Environmental Assessment (SEA). SEA is carried out by the authority that is responsible for the policy, programme or plan. However, the list of policies, programmes and plans has yet to be drawn up in a regulation; similarly, the required procedures for developing, reviewing and modifying SEA have to be regulated.

Morocco passed a decree on regulatory impact assessment in 2017. The decree requires that a bill be subject to an impact study, either before or after its preparation, by order of the Head of Government. However, the 2019 SIGMA-OECD assessment of the service delivery area in Morocco against the Principles of Public Administration noted that these provisions had yet to be put into practice with the exception of four regulatory impact assessments which were carried out and concerned PCBs, access to genetic resources, aquaculture and the civil aviation code.

Although environmental legislation is constantly progressing, the texts of application are in progress because of their number, their diversity and complexity and the stakes pursued by the various ministerial departments and professional bodies. The deadlines for their adoption and publication are difficult to control.

Since 2011, the country has put in place a comprehensive policy framework on the environment. The CNEDD sits at its foundation alongside the SNDD. Other programmes have been adopted covering a broad range of environmental issues.

The Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development is the national environmental authority responsible for developing and implementing national environmental policy. It is also responsible for the coordination of environmental protection at the national and, through its regional environment directorates (DREs), regional levels. The Department of Sustainable Development and the Department of Energy and Mines, each headed by a Secretary-General, together comprise the Ministry of Energy Transition and Sustainable Development.

Implementation and compliance mechanisms

Morocco has a broad legislative framework covering regulatory and compliance assurance mechanisms and has made some progress since 2011. A comprehensive system of environmental authorizations exists across a range of environmental issues, including air pollution, waste generation and disposal, surface and groundwater use, natural resource use, underground resources use, ozone-depleting substances and radioactive sources.

The Law on Environmental Assessment corrects the shortcomings of the previous 2003 law by providing for SEA, Environmental Impact Assessment (EIA), environmental impact statements (EISs) and environmental audit. It defines environmental assessment as a study that integrates the environmental and social aspects of a project, plan or programme or of public policy, which can be used to evaluate any foreseeable impacts and to consider and argue for acceptable solutions.

Projects subject to EIA fall into five categories; however, the current list of projects fails to integrate several related project categories, such as oil and gas pipelines, water supply systems, wind farms and quarries other than sand/rubble.

The lack of implementing measures remains the main challenge for the effective application of the Law on Environmental Assessment. The EIA and EIS procedures and the provisions on the creation and functioning of the National Commission for Environmental Assessment (CNEE) have not yet been established. Similarly, as at June 2021, the revised list of projects subject to EIA and the list of projects subject to EIS have not yet been submitted for adoption. Also, the available sectoral guidelines for conducting EIA do not cover all major sectoral projects. Currently, arrangements are underway for the promulgation of the implementing legislation for this law.

Whilst public participation takes place in the EIA process through public inquiries, regulations on the conduct of public inquiries do not require that EIAs be completed or submitted at the opening of the inquiry. Furthermore,

inquiry submissions make no mention of taking into consideration the socioeconomic impacts of the project on communities or the need for a resettlement action plan for projects that call for population displacement.

General emission limit values (GELVs), specific emission limit values (SELVs), general discharge limit values (GDIVs) and specific discharge limit values (SDLVs) have been adopted in some sectors. Nonetheless, gaps remain and some draft decrees on SDLVs in existence since 2011 have still not been adopted.

Product standards on toy safety, food safety and emission and fuel standards for vehicles are comprehensive. In the area of emission and fuel standards for vehicles, Morocco has aligned its standards with international product standards.

The definition of environmental self-monitoring lacks clarity and obligations vary across legislation. The 2020 Law on Environmental Assessment regulating environmental acceptances does not require periodic reports, on the implementation of said programmes and based on self-monitoring data, to be transmitted to the competent authorities.

The Environmental Police, working under the authority in charge of sustainable development, is in charge of enforcing compliance with environmental regulations. The Environmental Police oversees controls, inspections, searches, investigations and the recording of offences and issuance of fines covering the Laws on Protection and Conservation of the Environment; Environmental Assessment; Combating Air Pollution; Waste Management and Disposal; and on the Coastal Zone. The Water Police is in charge of controlling wastewater discharges.

Environmental liability and obligations for harm, loss or injury are broadly regulated by the 2003 Law on the Protection and Conservation of the Environment. It also stipulates that any natural or legal person or any regulated facility operator storing, transporting or using hydrocarbons or toxic or dangerous substances who causes bodily or material harm in the exercise of these activities is liable for damages.

The Department of Sustainable Development coordinates the Government's policy on environmental management and sustainable development nationally. Within the Department, the Directorate of Monitoring, Environmental Assessment and Legal Affairs oversees the enforcement and monitoring of compliance with environmental laws and regulations.

The regional activities of the Department of Sustainable Development have been strengthened by the establishment of regional and provincial branches. Nonetheless, at present, regionally and locally, the lack of capacity in terms of financial, human and technical resources prevents authorities from performing their tasks effectively.

Greening the economy and financing environmental protection

Morocco has made efforts to decrease harmful subsidies and launched several programmes to support the development of green energy sources. However, since 2011, there have been few to no changes regarding environmental taxes.

Economic-incentive mechanisms for greening the economy are used in different areas of concern such as air pollution, water pollution and plastic. Nonetheless, there has been little development in the area of waste management since 2011 and tax rates are low overall.

In 2016, the country has established an autonomous regulatory agency for the electricity sector, the National Authority for Electricity Regulation (ANRE), which is responsible for setting electricity tariffs.

Morocco has invested billions of dirhams across a range of strategies, programmes and plans to address environmental issues. One of these plans is the National Air Programme for the period 2018–2030 (PNAir), which was launched in 2018 and is expected to run until 2030. The Government has allocated 4 billion dirhams to ensure the implementation of this programme, a large part of which will be devoted to strengthening the air quality monitoring network.

Morocco manages public-private partnerships through the Ministry of Economy and Finance. The Strategic Investment Fund, with a target size of 45 billion dirhams, supports the financing of major public-private investment projects, in various fields of activity.

Several initiatives and programmes have been created to promote the creation of green jobs and green companies in Morocco, often in partnership with foreign organizations such as GIZ and the European Union. The three most prominent initiatives are Cleantech Morocco, the Green Business Incubator and Bidaya.

Morocco is vulnerable to climate change impacts due to a combination of political, geographic and social factors. The cost of adaptation strategies and plans in the period 2020–2030 is estimated to be US\$35 billion, while impacts from natural hazards are estimated to cost the country US\$800 million annually.

The transport sector was responsible of 20.6 per cent of CO₂ eq. emissions in 2018. In its Nationally Determined Contribution (NDC), the Government committed to reduce the country's greenhouse gas (GHG) emissions by 17 per cent by 2030, compared with a business-as-usual scenario. Efforts to mitigate emissions in the transport sector will amount to 9.5 per cent of all GHG reductions in the Moroccan NDC by 2030.

The Department of Sustainable Development coordinates the implementation of the SNDD, which includes the green economy, whilst the responsibility for the green economy was transferred to the then Ministry of Industry, Trade and Green and Digital Economy in 2020.

Environmental monitoring and information

Measures to improve air monitoring in Morocco have been introduced since the last EPR and are still ongoing. As at September 2021, there are 36 fixed monitoring stations in 15 cities, covering seven regions, and four mobile stations. Morocco also has 39 meteorological stations in different cities.

Steps have also been taken to establish a monitoring plan for persistent organic pollutants (POPs). It is foreseen that a database gathering all the information collected under this project will be developed as part of Morocco's national and global POPs monitoring plans.

Morocco has a comprehensive and large system of monitoring the water quality in the country. The monitoring of water quality focuses on 1,086 catchments, 51 dam reservoirs, 76 controlled treatment plants, 65 controlled wastewater treatment plants, 4,771 drinking water network points and 1,350 tanks.

Soil monitoring has been developed under the framework of the National Action Programme to Combat Desertification (PANLCD). A network of 30 observatories and two technical centres for desertification monitoring have been established to oversee and periodically monitor changes according to selected indicators, covering biophysical and socioeconomic factors.

There are no monitoring networks for noise and vibration, radioactivity or biodiversity. However, for radioactivity the country is in the process of elaborating a network and, for biodiversity, Morocco has taken steps to develop monitoring capacities to track the evolution of vulnerable species.

Morocco has a number of bodies and analytical laboratories involved in environmental monitoring. These include the National Laboratory for Pollution Studies and Monitoring (LNEP), the National Office of Electricity and Drinking Water (ONEE), laboratories within the Department of Water Quality Control, the National Institute of Hygiene, the National Institute of Fisheries Research (INRH) and the Public Laboratory for Tests and Studies (LPEE).

Moroccan citizens have the constitutional right to access information held by the public administration. Moreover, the Law on the Right of Access to Information, adopted in 2018, has been in force since 2020. The National Charter for the Environment and Sustainable Development grants every citizen the right to access environmental information, though the access to information regime remains under development.

The establishment of Regional Environmental and Sustainable Development Information Systems (SIREDDs) represents a major step forward for monitoring the environment. As of April 2022, all regions have their own

SIREDD installed. To complement the SIREDDs, the Department of Sustainable Development is also planning to create a national system of environmental information (SINE).

Morocco has some public databases, including for water, soil and forests; however, public databases remain non-existent for PRTRs and air, and there are no databases on noise and vibration or radioactivity.

The Department of Sustainable Development oversees the collection of environmental data and information. The Department has launched efforts to develop a national and regional environmental information system. However, despite improvements since 2011, no evidence has been provided that demonstrates how environmental indicators are being used to support decision-making.

Environmental democracy

Since March 2019, all public authorities have updated their websites to afford easier access to information of public interest. The active access to information mostly includes links to data and legal and regulatory texts related to the organizational structure and missions of the relevant department, administrative procedures, calls for tenders, application for positions, programmes and publications. However, the webpages dedicated to access to information of governmental institutions are not harmonized.

The Department of Sustainable Development undertook an overhaul of its website since 2011. All information is available in both French and Arabic. Moreover, almost every month, the Department publishes on its YouTube channel, and it has a Facebook page with 3,964 subscribers.

The Department of Sustainable Development leads a programme to mobilize selected trained journalists on environmental issues, organize onsite visits to sites and populations benefiting from environmental and sustainable development projects and creates regular press releases.

The Office of Ombudsperson (Mediator) of the King was instituted in 2011. The Office of the Ombudsperson is an independent institution whose mandate covers interactions between public service providers and citizens.

Law No. 31-13 sets the limitations of access to information and specifies that the refusal to provide information must be justified by the involved institutions and the administrations concerned. Absolute exceptions exist; however, according to the Ombudsperson, the interpretation of these limitations is not specified sufficiently to support a restrictive interpretation in favour of the public interest for the requested information.

The Department of Sustainable Development is strengthening its partnership with civil society. A division within the Department deals with civil society and the implementation of the related programmes concerning, specifically, the funding programme for associative projects and the NGO capacity-building programme.

The Department of Sustainable Development launches an annual call for projects from civil society. The areas of intervention are focused on preservation of natural resources, waste recovery, eco-districts, agroecology, climate change and ecotourism.

Cases related to environmental matters are handled by various courts depending on the subject. There are no environmental courts, although there was an experimental project that established an environmental court with specialized judges.

It remains a challenge for environmental NGOs to seek justice in environmental matters. Civil society associations have reported unending, expensive and difficult legal proceedings, a lack of legal aid and limited capacities. Many NGOs call for Morocco to accede to the Convention on Public Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention).

All ministerial departments, including the Department of Sustainable Development and its decentralized administrations, designated an official and his or her alternate in charge of passive access to information. The Department of Sustainable Development and its subordinated bodies are in charge of providing information on environment-related issues.

Education for sustainable development

The 2011 Constitution enshrines citizens' rights to equal access to modern, accessible and quality education and vocational training. Whilst a comprehensive legal framework for education for sustainable development (ESD) does not exist, environmental education is mentioned as an objective or a means of implementation in several legal documents.

ESD is not integrated into preschool or primary school. However, the Mohammed VI Foundation for the Protection of the Environment joined efforts with the ministry in charge of education to integrate the SDGs into the curricula for the final two years of primary education.

At the secondary level ESD is not developed or mainstreamed into college and qualifying secondary education, in either subject curricula or vocational training. Issues related to environmental and social dimensions of sustainable development are typically addressed as part of the general education stream's curricula of subjects under natural sciences, physical sciences and social sciences.

ESD is not developed and mainstreamed into technical and vocational education and training at all levels and in all professions to an appropriate degree. Students enrolled at the qualifying secondary level are learning issues related to environmental protection and sustainable development as part of their one-year common core cycle.

ESD is not integrated into higher education through a separate course of ESD, a specialization on ESD or a dedicated department to carry out research in and develop ESD.

The ministry in charge of education has initiated a deep revision of curricula and education programmes at all levels of education with a view to aligning all of them with the "skills-based approach". The education reform entails the reconceptualization of textbooks and teaching materials, which is also being considered by the ministry.

Teachers naturally involved in ESD, especially in the environmental dimension of ESD, are those teaching subjects related to life and earth sciences and history and geography. Challenges for mainstreaming ESD into teacher education and in-service training include developing adequate teaching approaches to address the cross-cutting nature of sustainable development and to integrate all the dimensions of sustainable development.

ESD is not included on a consistent basis in the training of civil servants. There is no mandatory training for civil servants organized by the ministry in charge of the environment, nor by other ministries and institutions. Staff usually undertake ad hoc and self-training related to their functions.

NGOs conduct activities to promote environmental education and ESD as part of their work and within the framework of various projects. NGOs identify the lack of adequate financial means as the main challenge to speeding up such activities and broadening them to a larger number of participants.

The SNDD serves as a framework for research and development in the areas of sustainable development and green economy. Research on ESD is also undertaken by the National Centre for Pedagogical Innovations and Experimentation and by Regional Centres for Education and Training.

ESD is included in the SNDD as a priority for strengthening eco-citizenship, through education, awareness and communication programmes. The ministry in charge of education has adopted a Sustainable Development Action Plan; however, concrete activities under each action, partners, timeline and resources needed for implementation are absent from the Action Plan.

The country developed a National Action Plan for Democracy and Human Rights (2018–2021), and the ministries in charge of human rights and of education, in partnership with the Citizenship Forum, launched the "School of Human Rights" programme with the objective to mobilize various school actors to integrate the principles and values of human rights into curricula, as well as to strengthen schools' role and capacity in promoting human rights.

Implementation of international agreements and commitments

Morocco is party to more than 100 multilateral environmental agreements (MEAs) on environmental protection and sustainable development. The country made progress in reporting more environmental agreements when compared with 2011 and implementation is ongoing. Morocco is cooperating with various countries to focus on knowledge transfer, the exchange of experience and technical assistance, as well as the development of projects in various environmental fields.

In 2016 Morocco hosted the 22nd Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). At the regional level, it hosted the fifth session of the African Regional Forum on Sustainable Development, the Islamic Conference of Environment Ministers and several capacity-building activities and workshops.

Morocco is fulfilling its reporting obligations for several MEAs to which it is a party. This includes the Convention for the Protection of the Ozone Layer, the Convention on Biological Diversity, the Convention on the Conservation of European Wildlife and Natural Habitats, the UNFCCC and the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.

Morocco has not yet acceded to the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. By ratifying the Convention, the country would have access to support and training possibilities to integrate such principles into national legislation.

Morocco has had an association agreement with the European Union since 1996, which includes provisions on environment and sustainable development. In 2021, the European Union offered to discuss modernizing trade and investment relations with Morocco, to better adapt them to today's challenges.

Morocco has several bilateral agreements which support different environmental projects, facilitate information sharing and exchange experience and technical assistance. Selected examples include agreements with France, Germany, Italy, Peru, Portugal and the United States of America, as well as South-South Cooperation.

The Ministry of Energy Transition and Sustainable Development is responsible for representing the Government in bilateral and multilateral negotiations in the fields of its competences, among other matters. The Department of Sustainable Development is the leading authority for the majority of MEAs.

Air protection

A study commissioned by the Department of Sustainable Development in 2019 demonstrated that the air quality in some cities had significant exceedances of limit values. Casablanca tops the list of the most polluted cities in the country. It is the city most exposed to two major sources of pollution: industry and traffic.

The national air quality monitoring network is still limited. There are 34 stations located in 15 cities and four mobile stations, which does not allow for the undertaking of a comprehensive survey of the air quality situation in the country. As such the country aims to increase the number of stations to 140 by 2030.

The management of the air quality monitoring network is delegated to the LNESP within the framework of the memorandum of understanding between the Department of Sustainable Development, Mohammed IV Foundation for Environmental Protection, the General Directorate for Local Authorities of the Ministry of the Interior and the General Directorate of Meteorology (DGM).

Some of the key pressures on air quality are energy, industry and mining, agriculture and transport. The agriculture sector is the second largest emitter of GHG emissions in Morocco and, due to Morocco's reliance on fossil fuels, energy is another major source of GHG emissions and air pollutants. Data on other sectors are limited.

Morocco has strengthened its legislative and regulatory framework for air quality over the past decades. Indeed, after the adoption of the Law No. 13-03 on Combating Air Pollution in 2003, several implementation texts were adopted to make it effective, including the 2009 Decree defining air quality norms and air monitoring methods, the 2010 Decree No. 2-09-631 sets sectoral limit values for the release, emission or discharge of pollutants into

the air from stationary sources and the procedures for their control, and the 2019 Decree on the National GHG Inventory System.

Morocco has also taken steps to incorporate short-lived climate pollutants into its policy to combat air pollution and climate change. Having joined the Climate and Clean Air Coalition's Supporting National Action and Planning (SNAP) on Short-Lived Climate Pollutants (SLCPs) initiative, Morocco's SNAP programme will focus on inventorying SLCPs such as methane, ground ozone and hydrofluorocarbons.

The Department of Sustainable Development is responsible for monitoring, developing and implementing the Government's environmental policy. The Department ensures the progressive management of the national air quality monitoring network and contributes to the financing directed to strengthening the air quality monitoring network. The Department also drafts laws and regulations related to the protection of air quality and monitoring and their implementation in accordance with the applicable legislation.

The Fund for Industrial Depollution (FODEP) carried out 15 projects for the treatment of atmospheric pollution. A financing line has been set up under the National Environmental Protection and Sustainable Development Fund (FNEDD) to finance, with up to 40 per cent in the form of a donation, the replacement of polluting traditional kilns by modern gas ovens.

Water management

Groundwater resources have been in decline in recent decades due to the decrease in rainfall and the occurrence of repeated droughts. An action programme has been set up for prospecting and carrying out studies concerning these aquifers; it is expected to be reinforced and accelerated in the years to come.

The quality of surface water has not changed since 2012. However, groundwater quality has worsened in the same period. Since 2007, surface waters of "good" and "average" quality have increased while those of "poor" and "very poor" quality have decreased. However, for both surface water and ground water, "excellent" quality is rare or absent.

The quality of drinking water has significantly improved in the last decade. Drinking water is closely monitored by the ONEE for treatment and distribution and the Ministry of Health and Social Welfare for its impact on human health.

Water availability is predicted to drop to 500 m³/capita/year by 2030 whilst water demand is projected to grow from 14.3 billion m³ in 2010 to 23.6 billion m³ in 2030. Water losses due to leakages and efficiency rates present a challenge for Morocco given the predicted decline in water availability. Solutions such as the construction of desalination facilities are being explored, as well as the reuse of wastewater.

The hydrological monitoring network has gone through several stages. The number of permanent hydrological stations has gradually increased, especially during the last four decades since the launch of the dam policy. Thus, the number of hydrometric stations increased from 35 in 1956 to 235 in 1996, reaching more than 325 hydrometric stations and 395 pluviometric stations in 2019.

The industrial and mining sectors have a heavy pollutant load due to the volume of wastewater discharged. Chemicals and paracheicals are the biggest polluters in terms of discharged volume, whilst the organic load discharged by the food processing sector also contributes to the large water footprint of the industrial sector. In 2015, the volume of wastewater produced by the mines in operation was evaluated at 1.07 million m³, with a total pollutant load of 36,576 kg/year of COD equivalent and 23,898 kg/year of BOD₅. These figures are not representative of the whole country since some mines did not communicate the volumes of wastewater produced.

Agricultural pollution puts heavy pressure on groundwater resources. This pollution results mainly from the use of fertilizers, inducing extremely high concentrations of nitrates in aquifers, reaching 200 mg/l. On average, 720,000 tons of fertilizer and 8,500 tons of pesticides are applied annually to cultivated areas.

The proportion of population using safely managed drinking water services (SDG indicator 6.1.1) increased from 91 per cent in 2015 to 93 per cent in 2018, representing a step forward towards SDG target 6.1. However, disparities still exist between urban and rural areas.

Morocco is particularly vulnerable to three types of climatic impacts: increasing temperatures, changes in rainfall patterns and increasing aridity. These impacts are associated with amplifying the frequency and intensity of extreme weather events, such as severe droughts and floods.

Sea level rise also poses a significant threat to Morocco. Coastal areas are home to 60 per cent of the country's population and economic activities. According to the World Bank, 42 per cent of the coastline will be at high risk of erosion and flooding by 2030.

The water basin agencies (ABHs) are facing numerous challenges related to the different aspects of water management. Human and financial resources available to the ABHs are inadequate to cover the responsibilities attributed to them by the Law on Water, in addition to the increasing challenges linked to the scarcity of water resources in a context increasingly marked by climate change.

The consequential damage of floods is significant despite their infrequency. Several initiatives have been launched as adaptation measures to climate change and for flood risk management. Special attention is paid to the modernization of measurement and warning networks by adopting hydrological telemetry.

The 2016 Law on Water and its implementing texts set the rules for the integrated, decentralized and participatory management of water resources to guarantee the right of access to water to all citizens, for its rational and sustainable use, and for better qualitative and quantitative valuation of water, aquatic environments and the public hydraulic domain (DPH) in general. The Law also determines the rules for preventing water-related risks to ensure the protection and safety of people, property and the environment.

The National Water Plan (PNE) sets strategic guidelines at the national level in terms of the development of water resources and the alignment of sector strategies and programmes. The National Shared Sanitation Programme (PNAM) aims to enhance access to sanitation and wastewater treatment and promote the reuse of treated wastewater.

Numerous players share responsibilities for integrated management, planning and governance of water at both the central and local levels. These include the Interministerial Commission on Water; the High Council for Water and Climate; the National Council for the Environment; the Economic, Social and Environmental Council and the High Council for Spatial Planning; ministries in charge of water, agriculture, the environment and the interior; ABHs; and regional councils.

Access to and sharing of information with the public, stakeholders and official entities is established through reports, official studies and seminars. Water education and awareness is implemented through the Moroccan education system. However, awareness-raising on water issues is carried out mostly by NGOs. Over the last decade, ministries and government entities have made digitized information available through official websites.

Waste management

Morocco has seen a population growth, rapid urbanization and the improvement in the standard of living of the population; however, this has led to an increase in the production of household waste. At the end of 2019, this was estimated at around 7 million tons/year.

Women are involved in the everyday generation and handling of waste and the informal sector accounted for 92 per cent of waste collection in 2014. However, several examples of successful projects show how women can contribute to better waste management while benefiting from economic empowerment. However, the gender aspect is mostly absent from legal documents and programmes. Moreover, gender-sensitive indicators are not used sufficiently and gender awareness in the waste-related projects and information campaigns is still low. This affects the habits of households and the education of children on waste management.

Morocco is performing well in fulfilling SDG target 11.6 and indicator 11.6.1. Morocco has a high collection rate of municipal solid waste (MSW) and relatively high landfilling rate. However, source separation of MSW is still not conducted on a large scale in Morocco but, rather, on a project level, and thus there is not enough sorted waste for continuous recovery operations in landfills and landfill and recovery centres.

Whilst there is a high collection rate of MSW, there is a low recycling rate compared with the total volume of MSW. The low recycling rate in the country is a consequence of the absence of a selective sorting system at source, which means that the quantities of recoverable waste are not large enough, thus penalising the profitability of the sector. MSW collection is conducted by private companies, usually based on medium-term contracts; currently, however, these contracts do not contain a target rate for the at-source sorting of waste that the service provider must achieve, with the exception of contracts established in recent years.

Morocco has introduced several projects, partnerships and roadmaps to ensure proper management of different types of waste, such as agricultural waste, radioactive waste, paper, plastics, used tyres, used batteries and end-of-life vehicles. For instance, Morocco was among the first countries to take seriously the pollution caused by plastic bags. This was mostly a reaction to the country's enormous consumption of plastic bags and its impact on the environment, which threaten serious consequences not only for the natural environment and human health but also tourism and the fishing industry.

A number of legal instruments addressing waste management have been adopted, with the Framework Law on the National Charter for the Environment and Sustainable Development providing the foundation for the reduction of waste at the source.

The National Household Waste Programme (PNDM) remains the main national strategy in the domain of waste management. The PNDM sets the goals for a 15-year period and defines clear objectives for the year 2022. An interministerial committee has been set up to facilitate and review the implementation of the PNDM, consisting of representatives of the Ministry of the Interior, the Ministry of Economy and Finance and the Ministry of Energy Transition and Sustainable Development. The National Waste Reduction and Recovery Strategy (SNRVD) sets strategic objectives for the sector, particularly in terms of the rate of recovery of different types of waste.

Biodiversity and protected areas

Morocco is rich in biodiversity and is an important country for global biodiversity. It is also an important part of the Mediterranean Basin. The variety of ecosystems in Morocco are home to more than 25,000 animal species and 8,371 plant species, as well as 7,830 marine species.

Although data on species diversity remains fragmented, conservation of some species continues to present challenges. As demonstrated in the 2020 VNR on the implementation of the SDGs, a number of actions have been taken to reduce the degradation of natural habitats, halt the loss of biodiversity and protect and prevent the extinction of threatened species, notably in forest areas but also in freshwater and mountain ecosystems.

The Rif, High Atlas, Middle Atlas and Anti-Atlas Mountains harbour 80 per cent of the country's endemic species. However, 64 per cent of mountain areas are described as being at an advanced level of deterioration. Only 7 per cent of the area are classified as having low to medium deterioration.

Morocco's official forest area covers 9,631,896 ha. According to the Department of Water and Forests, 3.2 million ha of natural forest have a forestry management plan. Forests are still threatened by unsustainable collection of non-timber products, overgrazing, clearing for agriculture, fire and urbanization.

There are several pressures on species and ecosystems in Morocco, including the growth in population; urban expansion; agriculture; livestock and overgrazing; fishing; illegal hunting and wildlife trafficking; logging; and transport infrastructure, energy projects and mining.

Climate change continues to have a drastic impact on biodiversity and ecosystems. Climate change impacts such as accelerated desertification lead to reductions in water availability and the amplification of invasive alien species. Moreover, climate extremes and changing climate averages lead to local extinctions. Sea-level rise and the increased frequency of extreme events are expected to increase coastal erosion, which may affect coastal

ecosystems and biodiversity, including the loss of coastal protected areas and critical estuarine and lagoon habitats.

Since 2014, Morocco has made progress in extending its network of conservation areas to afford protection to species and habitats. In 2014, the Department of Marine Fisheries created three Marine Protected Areas (MPAs) for sustainable fish resource management. A fourth biosphere reserve was designated in 2016 – The Atlas Cedar Biosphere Reserve, covering 1,375,000 ha across the Ifrane, High Atlas Oriental and Khenifra National Parks. Morocco also designated 2 new Ramsar sites in 2018 and another 12 in 2019.

Overall, the biodiversity-related legislative framework in Morocco has undergone substantial improvements since 2012, notably by incorporating international environmental commitments including biodiversity protection within new or amended legislation. However, it still contains several outdated laws and decrees.

The country has also made some progress in integrating biodiversity and ecosystem considerations into policies, strategies and other programmes. However, the insufficient coordination among the various sectoral ministers and departments at the national level and lack of financial resources present challenges.

Data on species and habitats remain fragmented and there are many gaps in knowledge on species and ecosystems. However, measures have been taken to improve monitoring and reporting and awareness-raising and communication campaigns were implemented throughout the country.

Coastal zone management

Morocco has 3,500 km of coastline and its littoral zone features three types of ecosystems: marine and coastal, land and continental waters. These ecosystems are home to numerous species of flora and fauna.

Sea fishing saw annual production levels in 2018 in excess of one million tons. Ninety-three per cent of this production is provided by 1,780 coastal fishing vessels and more than 16,000 artisanal fishing boats, 5 per cent by the deep-sea fishing fleet that comprises 320 active vessels, and 2 per cent by other activities, such as from algae, aquaculture and coral.

Women play a vital professional and domestic role in Morocco's coastal zones. They actively participate in collecting certain species, such as algae and shellfish, and in processing and marketing many fish catches.

The principal sources of pollution of coastal waters are agriculture and household and industrial wastewater run-off, resulting principally in the input of suspended organic and mineral matter, inorganic nutrients, which cause eutrophication, and xenobiotic substances, which have a toxic effect on natural ecosystems.

Moroccan coasts have been identified as being among the most vulnerable coastal systems to rising sea levels brought about by climate change. Some zones on the north coast are already being eroded at a rate of 1 m per year and the average global sea-level rise forecast by the Intergovernmental Panel on Climate Change would exacerbate erosion.

Morocco has made efforts to manage its coastal zones. The ambitious National Integrated Coastal Zone Management Plan (PNL) is aimed at ensuring a balance between development and conservation for coastal sustainability by adopting a holistic, integrated approach to development and a coordinated model for managing spaces and resources.

The Strategy Halieutis is a key strategy on the sustainable blue economy. The Plan was designed to be implemented via 16 strategic projects, including 3 with a major environmental impact in terms of scientific knowledge, quotas and fishing effort.

Through the National Commission on Integrated Coastal Zone Management (ICZM), a governance mechanism has been envisioned in the form of a network that will feature the creation of regional commissions on ICZM.

The commissions will also be involved in the event that there is an EIA that has implications for the coastal region.

Health and the environment

Life expectancy rose from 74.8 to 75.9 years between 2010 and 2016. In 2016, life expectancy at birth was 77.6 years for women and 74.3 years for men.

Demographic and epidemiological transition in Morocco is increasing the morbidity and mortality load of non-communicable diseases (NCDs). The principal NCDs in the Moroccan population are cardiovascular diseases, cancer, diabetes, chronic respiratory diseases, chronic renal failure and mental health disorders. There is evidence of a reduction in communicable diseases.

Air pollution is ranked sixth among the risk factors causing the greatest number of deaths and disabilities in Morocco. Since 1999 various studies of the health impact of air pollution have been conducted. Morocco does not collect indoor air measurements, though estimates attribute 1,350 deaths from indoor air pollution in Morocco in 2014.

The presence of lead in humans, especially children, remains a public health concern. There are a multiplicity of sources of exposure to lead in Morocco and studies have regularly warned of the need to take account of this public health issue and develop ways of preventing and limiting exposure.

Asbestos is still used as a building material in Morocco. In 2019, Morocco imported 572 tons of asbestos. According to an article published in 2015, almost 6,000 school classrooms in Morocco are constructed using asbestos. These schools are located particularly in rural areas where prefabrication is widely used in the construction of school premises. The methods for the dismantling, removal and disposal of asbestos are not set out.

There is little recent information available concerning the health of resident populations at abandoned or active mining sites. Without appropriate rehabilitation of Morocco's approximately 200 mining sites, these sites pose significant health and environmental problems for the surrounding communities.

Occupational risks rank 10th place in 2019 among the risk factors most responsible for death and disability in Morocco. No record is yet kept in Morocco of the number of fatal and non-fatal accidents at work per 100,000 workers, by sex and by immigration status or of the level of compliance with labour rights at national level by sex and migration status, in relation to International Labour Organization texts and national legislation.

The effects of climate change present a number of risks to Morocco. There is the risk of an upsurge in vector-borne diseases coupled with the risk that new vectors will be introduced, and that cardiovascular diseases linked to more heatwaves and a deterioration in air quality will increase. Furthermore, extreme weather events, such as flooding and cold snaps, aside from having a physical, psychological and social impact, could lead to a rise in diarrhoeal illnesses and respiratory diseases, particularly among children.

The health impacts of different issues not only carry a great human cost, but also a vast economic cost. A 2017 study estimated the cost of premature mortality due to ambient air pollution in Morocco to be between US\$420 million and US\$1.15 billion. In 2014, the average cost of deaths due to diarrhoeal illnesses resulting from deficiencies in the drinking-water supply, sanitation and hygiene services was estimated to be 1.51 billion dirhams. The estimated financial cost of exposure to lead for children under five years of age in Morocco was calculated to be 642.8 million dirhams.

Industry and the environment

The contribution of industry to overall GDP was 16.9 per cent in 2019. Industrial exports accounted for more than 85.5 per cent of Morocco's total exports in 2019 and amounted to 243 billion dirhams. Between 2011 and 2018, despite a production downturn, the chemicals and paracheicals sector ranked first among the main industrial sectors.

The automotive and aeronautics sectors produce the largest number of exports in Morocco. Since 2015, automobiles have been the main national export product in a sector with sales value reaching over 80 billion

dirhams in 2019. The aeronautics sector has created close to 11,313 direct jobs and had a turnover of 15.6 billion dirhams in 2019.

The mining sector is an essential component of Morocco's social and economic development. In 2017, it accounted for close to 10 per cent of GDP, and about 80 per cent in volume and 20 per cent in income of exports, besides creating some 41,000 direct and indirect jobs.

Industry and mining significantly contribute to environmental degradation in Morocco. Such issues include air pollution, climate change, soil pollution, water pollution and biodiversity loss. The sectors also have a drastic impact on human health.

Whilst there are legal provisions to regulate the mining and industrial sectors, provisions on the environment are largely inadequate. The list of unhealthy, inconvenient or dangerous industrial facilities has remained largely unchanged since 1914 and 1993, and a 2014 Dahir is still being revised. Major shortcomings that were identified in 2011 have still not been resolved.

Several policies cover industry in Morocco. Many focus on the green economy, such as the Industrial Recovery Plan, SwitchMed and the National Strategy for Waste Reduction and Recovery, whilst others specifically focus on depollution, including the National Plan to Control Water Pollution from Mining by the year 2040, the National Plan to Control Water Pollution from Industry, the National Plan to Fight Water Pollution in the Olive Industry and the National Study on the Depollution of Industry.

The private sector has been participating in various initiatives to contribute to environmental protection and the greening of Moroccan industry. Large enterprises are more involved in environmental protection than small and medium-sized enterprises or very small enterprises, which are less able to finance such activities. This commitment is not yet very strong.

Innovation is key to building green industry. While there has been significant progress in terms of infrastructure and human capital, the performance of the innovation system remains limited.

Energy and the environment

Morocco aims to increase the share of clean energy in the electricity mix to 52 per cent by 2030. So far, the share of renewables in total final consumption has fluctuated. It reached 20 per cent in 2005 and then decreased to 10 per cent in 2018. The installed renewable electricity-generating capacity increased from 48 W/capita in 2012 to 89.58 W/capita in 2019.

In 2015, Morocco's energy sector accounted for nearly 3.1 per cent of the country's GDP and employed around 0.4 per cent of the workforce. Morocco's consumption of oil products increased from almost 10.8 million tons in 2012 to 11.8 million tons in 2018. Morocco does not have its own fossil energy resources; therefore, it is heavily dependent on imports.

Firewood and plant and animal residues are still used as a source of energy for cooking in rural areas. In rural areas, 65.5 per cent of women are involved in collecting, delivering and storing wood and residues. The burning of wood and charcoal has consequences for the environment and health: it generates emissions of more than 100 highly toxic contaminants that are very harmful to health, causing respiratory infections, chronic lung disease, lung cancer and vision problems.

Morocco has started to utilise the potential of renewable energy, especially wind. A 300 MW wind farm was inaugurated in December 2014 in Tarfaya. The Jbel Sendouq-Khalladi ("Khalladi") wind farm project extends through three rural communes, its 40 wind turbines with a nominal unit capacity of 3 MW providing a total capacity of 120 MW. Moreover, the country already has several advanced operational solar plants and others are under construction.

The Law on Renewable Energies addresses the legal framework for renewable energy and related investments. It has three declared objectives: to promote the production, marketing and export of energy from renewable sources by public or private entities.

Agriculture and the environment

Morocco has undertaken efforts to modernize the agricultural sector through the framework of the Green Morocco Plan 2008–2019 (PMV). Agricultural GDP shows sustained and less volatile growth, depending less and less on cereals during the period 2008–2019 compared with the decades 1998–2007 and 1988–1997.

Morocco has a wide variety of crops, the main ones being cereals, citrus, olives, fruits, sugar beets and pulses. Other crops such as cotton, sugar beet, sunflowers, tea, tobacco and soybeans are also grown in Morocco.

Oases, which are an essential component of Morocco's national heritage, are particularly threatened by climate change. The desertification affects both plants and the communities living in these areas, which tend to already be vulnerable. The Government and different associations have implemented partnerships and projects for oasis conservation and resilience.

Morocco's agriculture consumes more than 87.3 per cent of the renewable water and gravity irrigation is dominant. Of the 8.7 million ha of useful agricultural area, 1.46 million ha are irrigated. Irrigation programmes have made it possible to equip nearly 873,049 ha with drip irrigation, for an investment of nearly 36.6 billion dirhams for the benefit of 270,579 farms.

Morocco's soils are quite fragile due to their low organic matter content. The problem of increasing saline soils is also an issue, as well as erosion and poor water quality.

As the agricultural sector is vulnerable to climate change, Morocco has taken measures to improve the resilience of the sector. Measures undertaken in the framework of the PMV have focused particularly on irrigation water control. Efforts to adapt to climate change are also pursued within the framework of Generation Green 2020–2030.

Through the implementation of the PMV, agricultural GDP has steadily increased. Agricultural GDP increased from 77 billion dirhams in 2008 to 125.4 billion dirhams in 2018, with an annual rate of growth of 5.25 per cent.

Women play an important role in agriculture, though are particularly vulnerable to environmental pressures which affect their working conditions. Programmes have been implemented to support women by international organizations and the Government, such as the project entitled Economic Empowerment of Women in Morocco's Argan Sector (REFAM), and elements within the PMV and Generation Green 2020–2030 also target women.

Institutional reform started with the adoption of the PMV in 2008. This period was marked by the creation of the Agency for Agricultural Development of Morocco (ADA), the establishment of 12 Regional Directorates of Agriculture and their local representations, as well as the National Office of Agricultural Advice, the National Agency for the Development of Oasis and Argan Zones (ANDZOA), the Department of Agriculture and the National Office of Food Safety (ONSSA).

Implementation of recommendations from the first EPR

The first EPR of Morocco (2014) made 60 Recommendations comprising of 119 sub-recommendations, of which 58 were implemented or partially implemented (49 per cent), 28 are in progress of being implemented (23 per cent) and 33 were not implemented (28 per cent). The country has an implementation rate (recommendations implemented, partially implemented or in progress) of 72 per cent. Of the 119 sub-recommendations, 18 are still relevant for the country to pursue their implementation.

Annex 1 presents an overview of implementation of recommendations of the first EPR. A detailed assessment of the status of their implementation is integrated in the relevant chapters.

Top achievements during past decade

1. Established the strategic and institutional frameworks and defining the modalities for monitoring and reporting on the implementation of sustainable development in the country.
2. Strengthened the institutional framework for integrated environmental protection and management, by establishing the Department of Sustainable Development within the Ministry of Energy Transition and Sustainable Development.
3. Enhanced the legal framework for environmental protection with the adoption of several new laws, including regulating environmental assessment, water management, and access to information.
4. Established the Office of Ombudsperson in 2011 to facilitate interaction between the public and public authorities.
5. Put in place comprehensive product standards on toy safety, food safety and emission and fuel standards for vehicles.
6. Launched several initiatives to promote green jobs and green companies, including Cleantech Morocco, the Green Business Incubator and Bidaya.
7. Improved the monitoring of air, water and soil quality and establishing the Regional Environmental and Sustainable Development Information Systems (SIREDDs).
8. Improved the quality of drinking water and increasing access to safe drinking water.
9. Generalized SIREDD to all regions and launched the implementation of SINE
10. Extended the network of conservation areas, thus protecting species and habitats.
11. Increased the collection rate of municipal solid waste and the landfilling rate, as well as rehabilitating 53 uncontrolled landfills.

Top priorities during next decade

1. Reinforcing and accelerating the development and implementation of secondary legislation for operationalizing the implementation of laws on the ground.
2. Establishing the National Commission for Environmental Assessment (CNEE) and adopting the updated list of projects subject to EIA and environmental impact statements, developing EIA guidelines to cover all relevant sectors and revising the regulations to ensure meaningful and timely public participation in the EIA process.
3. Revising and developing new environmental taxes. Establishing waste management economic incentives and revising the taxes. Defining, harmonizing and establishing clear and comprehensive procedures for enterprises to undertake environmental self-monitoring.
4. Reinforcing the monitoring of air quality, as well as establishing the monitoring of noise, radiation and biodiversity and setting up related databases.
5. Addressing pollution from the industrial, mining and agriculture sectors. Greening the industry and mining sectors. Accelerating the replacement of polluting traditional kilns with modern gas ovens and innovate to produce environmentally and health friendly cooking and heating devices.
6. Addressing coastal zone erosion and flooding, including by developing and implementing the National Integrated Coastal Zone Management Plan (PNL) and accelerating SRLs development.
7. Reducing the impact of air and water pollution on public health, and that of lead contamination of humans, especially children, and banning the use of asbestos in the construction.
8. Promoting waste recovery within a circular economy and increasing the recycling rate of municipal solid waste, including by introducing a target rate for the at-source sorting of waste that must be achieved by the service provider.
9. Integrating education for sustainable development in formal education at all levels and providing adequate financial resources to enable its implementation on the ground across the country.
10. Taking into consideration the needs of vulnerable groups of population, especially women and children, and including such considerations in legal and policy documents, as well as in their implementation on the ground.

INTRODUCTION

1 Physical context

Morocco is located in North Africa and has a land area of 710,850 km². The country has a high variety of elevation, from the lowest point of Sebkhah Tah, 55 metres below sea level, to the highest point of Jebel Toubkal, which rises to 4,165 metres.

A large part of Morocco is mountainous. The Atlas Mountains, running from the south-west to the north-east, are mainly located in the centre and south of the country, forming its backbone. The Rif Mountains are located in the north, stretching from the north-west to the north-east across the region bordering the Mediterranean Sea. Most of the south and south-east portion of the country is the sparsely populated Sahara Desert.

Along the coast of Mediterranean Sea, the climate is warm, with dry summers and mild winters. Inland, the climate is more severe, getting hotter and more extreme closer to the Sahara Desert. On the Atlantic Ocean coast, Morocco's capital, Rabat, has an average January low temperature of 8°C and an average July high temperature of 28°C. By contrast, the city of Marrakesh, which is located farther inland, has a January average low of 6°C but a much-elevated average July high temperature of 37°C.

Average annual precipitation can reach more than 1,000 mm in the mountainous areas of the north but is less than 300 mm in the basins of the Moulouya, Tensift and Souss-Massa and in southern areas, including the Atlas Mountains and the Saharan zone. Typically, there are two rain periods per year, one in the fall and one in winter. The annual number of rainy days varies from about 30 in the south of the country to near 70 in the north.

2 Population, gender and poverty eradication

Demographic context

Morocco had an estimated population of 36.471 million people in 2020. Casablanca is the largest city, main port and economic and business centre of Morocco. According to the 2019 population estimate, the prefecture of Casablanca had a population of 3.71 million.

Rabat, located on the Atlantic Ocean at the mouth of the Bou Regreg River, is the capital and third largest

city of Morocco, with a population of approximately 577,827 in 2014. Rabat, together with the commuter towns of Salé and Témara, is part of an urban agglomeration with a population of 1.885 million.

The country has had steady population growth for the past two decades. From 2010 to 2019, the total population grew by 12.76 per cent while the birth rate decreased by 10.71 per cent. Life expectancy has been on the rise and female and male life expectancy at birth increased by 2.6 and 2.9 years respectively. Women can expect to live about two and a half years longer than men.

While life expectancy increased, the total fertility rate decreased, from 2.57 in 2010 to 2.42 in 2018. While the infant mortality rate was 39.4 per thousand in 2003, it decreased to 27.50 per thousand in 2010 and continued to diminish to 19.20 per thousand in 2018 – a drop of 51.27 per cent in 15 years.

There has also been a change in the composition of age groups. The proportion of under-15-year-olds in the population continued to diminish, decreasing from 28.51 per cent in 2010 to 26.97 per cent in 2019. During the same period, the over-65 age group increased from 6.14 per cent to 7.3 per cent of the population.

Gender balance

Morocco acceded to the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) in 1993 and since the ratification the Government has submitted progress reports on the Convention to the United Nations, each showing progress towards reforming the legal code and improving the status of women.

Moroccan laws are largely based on French civil law and Islamic law (Shari'a). There is no unified personal status law that applies to all Moroccans. The Muslim, Christian and Jewish communities have separate family laws related to personal status such as inheritance, marriage, divorce and child custody. Because about 99 per cent of Moroccans are Muslims, the most important of these laws is the Moudawana, a family code enacted in 1957 and based on Islamic law.

The Moudawana was reformed in 2004 and is considered one of the most progressive in the Arab world. It provides Moroccan women several important rights, such as the right to self-guardianship, the right

to divorce and the right to child custody. The new Moudawana also introduced modifications to the rules of inheritance, raised the minimum legal age of marriage from 15 to 18 years, and ended the requirement of women to have a male guardian approve their marriage. Parallel with the development of the Moudawana, the Criminal Code has taken actions against gender-based violence, cracking down on non-partner sexual assault and repealing the rape marriage law, which allowed a rapist to evade punishment by marrying his victim.

The progress towards gender equality, however, seems to have reversed over the past decade compared to international indices on gender equality. The country's score under the United Nations Development Programme (UNDP) Gender Inequality Index² went from 0.510 in 2011 to 0.454 in 2019, and consequently, the country's rank dropped from 104th in 2011 to 111th in 2019, of the 189 countries compared. The World Economic Forum (WEF) 2020 Global Gender Gap index³ gave Morocco a score of 0.605, ranking it 143rd of 153 countries, 15 places lower than in 2011.

The education sector is experiencing near gender parity in primary education; in fact, according to the official statistics of the Ministry of National Education of preschool education and sports for the 2018–2019 school year, the enrolment rate of girls is slightly lower than that of boys (99.7 per cent for girls against 100 per cent for boys). However, the gap between girls and boys is widening in secondary education and the enrolment rate in university is 89.3 per cent for girls and 94.2 per cent for boys and, in qualifying, this rate is 65.5 per cent for girls against 68.2 per cent for boys.

Moroccan women have had the right to vote and to stand for election since the country's independence in 1956. Since then, Morocco has sought to integrate women into the political, economic and socio-cultural life of the country. This is clearly reflected in the successive constitutions since 1962, which affirm that women and men enjoy equal political rights. The particularity of the 2011 Constitution is that it enshrines the principles of equality and non-discrimination in favour of women, right from the preamble, which focuses on equal opportunities; the protection and promotion of human rights; and the

fight against any discrimination on the grounds of sex, colour, creed, culture, social or regional origin, language, disability or any other individual characteristic.

The year 2011 marked a turning point in the efforts to strengthen women's representation in politics, a step forward in a reform process that began in the early 2000s and included the Family Code and the place of women in society in 2004. In 2011, the reform of the Constitution established, among other things, gender equality as a constitutional principle, thus consolidating the achievements of the 2004 Reform.

In 2021, the revision of women's representation was one of the main amendments of the new electoral law. As such, the rate of women's representation at the national level will increase from 21 per cent in 2016 to 25 per cent. This rate will bring Morocco in line with the world average. On 1 January 2021, the share of women in the national parliament reached 25 per cent, according to a joint report by UN-Women and the Inter-Parliamentary Union (IPU).⁴

The principle of equality between men and women in Morocco was also instituted in the 2011 Constitution. To this end, the institutional framework has continued to evolve and has been enriched since 2013, with particular attention paid to the role of women in environmental governance (Box 1). Nonetheless, despite these legal changes, its scores on gender indexes indicate that, in practice, Morocco is not making enough of an effort to ensure gender equality and further promote the integration of women into national politics and the economy.

Poverty eradication

Morocco's steady economic progress, in combination with its poverty eradication policies, has started to have an effect on citizens' lives. According to a 2017 World Bank study,⁵ the level of poverty in the country declined between 2001 and 2014. Consumption per capita increased at an annual rate of 3.3 per cent (3.9 per cent for the bottom 20 per cent of the population). Poverty, measured by the national income thresholds, declined from 15.3 per cent in 2001 to 4.8 per cent in 2014 while vulnerability fell from 22.8 per cent in 2001 to 12.5 per cent in 2014.

² <http://hdr.undp.org/en/content/gender-inequality-index-gii#:~:text=It%20measures%20the%20human%20development,major%20areas%20of%20human%20development>.

³ www3.weforum.org/docs/WEF_GGGR_2020.pdf.

⁴ <https://data.ipu.org/women-ranking?month=1&year=2022>.

⁵ www.worldbank.org/en/country/morocco/publication/poverty-in-morocco-challenges-and-opportunities.

Box 1: Gender and environmental governance

The Rio Declaration on Environment and Development of 1992 reaffirmed the critical role that women play in addressing environmental challenges. In the Global Gender Gap Index of 2020, Morocco was ranked 143rd of the 153 countries reviewed. Since 2000, Morocco has made efforts to integrate the gender aspect into its environmental commitments and governance.

The 2011 Constitution clearly expresses the equality of men and women while incorporating direct references to gender equality in environment-related rights. The Constitution guarantees equal access for citizens to the conditions allowing them to enjoy rights such as access to water, a healthy environment and sustainable development. In addition, Organic Laws Nos. 28-11, No. 34-15 and No. 59-11 ensure that women's decision-making power in the Council chamber and in their territorial communities will increase. Internationally, Morocco is party to various international agreements, including the UNFCCC, which reaffirms the essential role of women in addressing the challenge of climate change. At the 2020 International Conference on Women, Peace and Security, the Government reaffirmed its commitment to promote gender equality, underlining the role women have in governance, including in security and peace promotion.

Gender equality targets are established in specific strategic plans. The Government Plan for Equality, "Joint initiative for strengthening the advancement of Moroccan women" (ICRAM 1) (2012–2016) built on eight areas to fight gender disparity, aiming to improve the economic opportunities, rights and decision-making power of women. It was followed by ICRAM 2 (2017–2021) with new measures building on the same lines as its predecessor.

Within this framework, the departments in charge of the environment and water have implemented measures to institutionalize gender aspects. A dedicated gender unit under the direction of the Secretary-General of each department was established. These units are endowed with a specific budget for gender programmes and have a departmental gender mainstreaming strategy aiming to reinforce the institutionalization of gender equity. Moreover, in 2015, a requirement for gender-sensitive budgeting was introduced in the 2015 Organic Law No. 130-13 on the Law on Finances and an annual report assesses how gender is taken into consideration in the ministerial programmes in terms of objectives and indicators.

Efforts are made to progress towards gender equality in environmental governance to meet national objectives and strategies. Training for women has been carried out to enhance their career opportunities in executive positions. Since 2016, the Department of the Environment (now of Sustainable Development), in collaboration with Cleantech, has awarded a prize for entrepreneurial women. A system of children's nurseries for mothers working in the ministerial departments was approved in 2019–2020 but had to be postponed due to the COVID-19 pandemic.

Despite these achievements, the gender units of the departments in charge of the environment and water concluded that gender awareness within their departments is low, women are not adequately represented at the decision-making level and the gender approach in project designs is not implemented. The Law on Environmental Impact Assessment does not demand a gender analysis and gender-sensitive indicators are mostly lacking. The units intend to increase gender sensitization within the departments and expand the training for women to boost their participation in the job market and decision-making processes.

The urban poverty rate has decreased faster than the national rate: in 2001, urban poverty was half the national level; in 2014, it had decreased to one third of the national level. The poorest regions saw greater poverty reduction and higher income growth; for example, Drâa-Tafilalet, the region with the highest poverty rate, had a 40 per cent poverty rate in 2001 and 14.6 per cent in 2014. At the sub-national level, the evolution of living standards between 2001 and 2014 attests to a convergence between the 12 administrative regions of the country, even if the pace of attenuation of regional differences has not been identical everywhere. The convergence coefficient reveals that living standards in less wealthy regions have improved more rapidly than in wealthier regions. Thus, in Fez-Meknes and in the Oriental region, this convergence was noticeable, unlike Drâa-Tafilalet and Beni Mellal-Khénifra, where the progress was slower. Moreover, it is far from complete; at an annual rate of 4 per cent, halving the initial regional disparities could take another 24 years.

The improvement in living standards of the population has produced a change of consumption patterns, with a reduction in the food share of income and diversification towards food of higher nutritional value.

The poverty reduction policies have been a diverse combination of initiatives, social transfers and access programmes, the objective of which has been to provide educational and social support to the most disadvantaged while improving their purchasing power. This has been achieved using economic and financial measures, such as neutralizing the price increases of basic goods including cereals, sugar and butane through the Compensation Fund, increasing public sector salaries and pensions, lowering income taxes, providing microcredits, increasing minimum salaries, providing subsidized health care and adopting a targeted policy that allows local development programmes to be aimed at poorer citizens and less developed areas.

Photo 1: Tensift-El Haouz, Marrakesh-Safi Region



Photo credit: Department of Sustainable Development

The National Initiative for Human Development (INDH) directly supports local communities. Its first phase, with a budget of 10 billion dirhams from 2005 to 2010, targeted 403 rural communities and 264 urban districts, achieving a 41 per cent decline in the poverty rate while creating 40,000 permanent jobs. In the second phase, from 2011 to 2018, 18 billion dirhams were spent focusing on health, education, roads, water, sanitation and electrification and aimed to develop the mountain areas and rural communities where the poverty rate is higher than 14 per cent. Together, phases I and II enabled the implementation of more than 43,000 human development projects. The third phase of the INDH,⁶ from 2019 to 2023, has two objectives: (1) preserving dignity and improving living conditions; and (2) building a brighter future. Both objectives are divided into two programmes and the 18 billion dirhams budget is divided equally between them.

Morocco has risen steadily on the UNDP Human Development Index (HDI)⁷ since 2000, from a score of 0.507 in 2000 to 0.582 in 2011 and 0.686 in 2019, ranking the country 121st out of 189 countries with

comparable data. Morocco belongs to the group of medium human development countries, but its HDI is still slightly below the Arab States regional average of 0.703.

Although Morocco has seen positive developments in the economic, social and political spheres over the long term, the report on Africa's Development Dynamics of 2018⁸ of the Organization for Economic Co-operation raised issues and inconsistencies in the development of the country. Moreover, Morocco's economic development has not benefited the entire population in an equitable manner. For example, the unemployment rate among urban youth remains very high (38.8 per cent), while the average unemployment rate in 2020 was 9 per cent. Similarly, economic growth has failed to reduce the country's income inequality.

Morocco's Gini coefficient, measuring income inequality, is the highest in North Africa at 40.3 per cent, compared with 35.8 per cent for Tunisia, 30.8 per cent for Egypt and 23 per cent for Algeria. Morocco thus has the region's largest gap between the incomes

⁶ www.indh.ma/wp-content/uploads/2019/09/Livret_INDH_VANG.pdf.

⁷ <http://hdr.undp.org/en/composite/HDI>.

⁸ www.oecd-ilibrary.org/development/africa-s-development-dynamics_3290877b-en.

of people at the top and bottom of the socioeconomic ladder.

3 Economy

Morocco's economy has increased continuously and steadily since 2014. Measured by gross domestic product (GDP), Morocco was the fifth largest economy in Africa in 2019, according to the World Bank.⁹ Its steady economic policies placed Morocco as the third most competitive economy in Africa and first in North Africa according to the WEF 2019 Global Competitiveness Index.

Numerous business opportunities and prevalent economic prospects led to Morocco receiving the fourth largest amount of foreign direct investment (FDI)¹⁰ of all the African countries in 2018. For many years, international investors have considered the Moroccan economy to offer rewarding investment opportunities. This has kept the country's annual FDI level at about 2.52 per cent of GDP over the last decade. The main sectors attracting FDI have been

textiles, electronic components, offshore services and the labour-intensive tourism sector.

Improving the country's business environment has been the Government's consistent policy goal and, since 2005, Morocco has implemented various business regulatory reforms. The financial sector reforms have been implemented, state enterprises are being privatized and, from 2018, the Moroccan dirham has been fully convertible for current account transactions.

In *Doing Business 2020*,¹¹ the World Bank found that Morocco had simplified and streamlined the construction permitting process, facilitated the availability of electricity, strengthened the protections of minority shareholders, reduced corporate income tax, facilitated border trading procedures and made the enforcement of contracts easier. The World Bank had ranked Morocco 94th of 183 economies on the ease of doing business in 2011. In the following eight years, Morocco improved its business regulation and climbed 41 places, ranking 53rd of the 190 economies studied in 2019.

Photo 2: Bin el Ouidane Lake, Azilal Province, Beni Mellal-Khénifra Region



Photo credit: Department of Sustainable Development

⁹ <https://databank.worldbank.org/source/world-development-indicators>.

¹⁰ <https://unctad.org/news/foreign-direct-investment-africa-defies-global-slump-rises-11>.

¹¹ <https://openknowledge.worldbank.org/bitstream/handle/10986/32436/9781464814402.pdf>.

Since 2010, annual GDP growth has been positive, fluctuating between 1.06 and 5.25 per cent a year. In 2016, GDP growth dipped to 1.06 per cent due to a poor harvest, but it picked up rapidly and returned to an annual rate of 4.2 per cent in 2017. GDP growth, hindered by a volatile agricultural sector and a stagnating services sector, declined again in 2019 to 2.3 per cent. However, the average annual growth from 2010 to 2019 was 3.44 per cent. During the same period, GDP per capita, measured by 2017 prices and purchasing power parity, increased 19.58 per cent. Inflation, measured by the Consumer Price Index (CPI), has been at a very low level. Between 2010 and 2019, the CPI was generally under 1 per cent but temporarily accelerated to 1.9 per cent in 2013 and again in 2018, dropping to 0.2 per cent in 2019.

The current account balance as a percentage of GDP deteriorated sharply, from 4.2 per cent negative in 2010 to 9.7 per cent negative in 2012, but after some fluctuation rose to 4.1 per cent negative in 2019.

The composition of the economy has stayed stable throughout the past decade and is weighted towards services, which, in 2019, produced 50 per cent of GDP, while industry's share was 26 per cent and agriculture produced 11.4 per cent. Even though the economy has become more diversified lately, the agricultural sector plays a bigger role in the country's economic development than its share of GDP implies, both because it employs about 34.7 per cent of the country's workforce and because the occurrence of ever-present drought can dramatically affect the aggregate value added of agricultural production.

In 2020, the economy faced a difficult and complex situation. The crisis caused by the Covid-19 pandemic was singular, multi-channel and fundamentally different from previous crises. It altered the productive system through a double shock of supply and demand, amplified, in passing, by a crisis of confidence. It was therefore necessary to draw up an initial detailed assessment of the ramifications of this crisis. Thus, several approaches were deployed to provide approximate orders of magnitude of the impact of the crisis on economic activity and macroeconomic and social balances.

As the crisis fades, the budget deficit is being reduced. A more moderate deficit than many of its peers at the beginning of the pandemic allowed the Moroccan authorities to implement a countercyclical increase in public spending in response to the crisis. Although public spending continued to rise in 2021, a sharp

recovery in revenues allowed the government to start reducing the budget deficit. As a result, the accumulation of public debt has slowed, and the authorities have not resorted to international markets to cover their financing needs since December 2020.

With agricultural production returning to average levels, GDP growth is expected to slow in 2022. After a bumper harvest in 2021, agricultural production is expected to contract slightly in 2022, lowering the overall growth rate of the Moroccan economy. This outlook is, however, subject to considerable uncertainty, with the COVID-19 shock having taken its toll on the Moroccan private sector, and risks to the global economy intensifying, particularly with the circulation of new COVID-19 variants.

To embark on a growth path consistent with the ambitions of the New Development Model (NMD), a strong and cross-cutting reform agenda will be essential. In May 2021, Morocco unveiled its NMD, which sets ambitious targets that require a strong rebound in economic growth. The thematic chapter demonstrates that episodes of accelerated growth such as those envisaged by the NMD are rare, but not unprecedented in the global economy. To achieve this, Morocco will have to overcome its over-reliance on capital accumulation as the main source of growth. Indeed, various simulations suggest that, to double its GDP per capita by 2035, the Kingdom will need to significantly increase the contributions of productivity, labour and human capital formation to economic growth. This will only be possible if the NMD is translated into sustained and multifaceted structural reforms.¹²

Morocco's unemployment level has been very stable throughout the review period: in 2010, it stood at 9.1 per cent and at the end of 2020, at 12.2 per cent. Expatriate workers' remittances have historically formed a substantial share of Morocco's balance of payments and GDP. Between 2010 and 2019, the annual average share of remittances of Morocco's GDP was 6.5 per cent. In the peak year of 2014, remittances formed 7.1 per cent of GDP, but since then the share diminished to 5.7 per cent in 2019 when expatriate workers sent home €5.6 billion.

Mining is one of the top sources of Morocco's export revenue, accounting for 21.1 per cent of total exports in 2020 and employing more than 40,000 people. Although Morocco's mining sector exploits a range of metals and minerals, it is dominated by phosphates. Estimates of the importance of the phosphate industry

¹² Morocco Economic Monitor, Fall 2021: From Recovery to Acceleration. www.worldbank.org/en/country/morocco/publication/morocco-economic-monitor-fall-2021.

to the country's GDP vary but the Oxford Business Group estimated that, in 2015, the mining sector produced 10 per cent of Morocco's GDP, 90 per cent of which came from phosphates.¹³ Morocco possesses 70–75 per cent, or 50 billion tons, of the world's phosphate reserves. It is the world's biggest phosphate exporter (34 per cent of the global market) and second biggest producer (22 per cent of global production). In 2020, Morocco produced 37.442 million tons of phosphates. Although the country's dependence on phosphate exports has shrunk in the past years, when the exports of manufactured and agricultural products, combined with growing tourism, have picked up, the price fluctuations of phosphates on the international market can still have a serious effect on Morocco's economy.

The growing tourism sector has become an important part of Morocco's economic development. Between 2000 and 2018, it grew at a 6 per cent average annual rate, created new jobs, and contributed to economic and social development and bringing in foreign currency. In 2018, when Morocco recorded 12.3

million international arrivals, its tourism sector had 550,000 direct jobs, constituting 5 per cent of total employment. In the same year, tourism-generated GDP was 76.9 billion dirhams and its share of GDP reached 6.9 per cent. The COVID-19 pandemic devastated the tourism industry, though its long-term effects on the future of tourism development cannot yet be estimated in 2021.

4 Political and administrative contexts

Morocco is a democratic, parliamentary and social constitutional monarchy. The Constitution provides for a monarchy with a parliament and an independent judiciary. The Head of Government (known as the Prime Minister until 2011) leads the Government, which exercises the executive power, although the King holds executive and legislative powers, including the power to dissolve the parliament and issue royal decrees called dahirs that have the force of law. In a conflict situation, the King's decision usually overrides that of the Government.

Photo 3: Rabat



Photo credit: ECE EPR Team

¹³ <https://oxfordbusinessgroup.com/overview/new-tricks-having-traditionally-relied-phosphates-industry-mining-sector-diversifying#:~:text=The%20kingdom%20possesses%20an%20estimated,of%20this%20coming%t20from%20phosphates.>

The country had already started to reform and transform its political system in the 1990s with constitutional revisions. The 2011 reforms were politically significant and advanced societal changes. Not only did those reforms transform Morocco into a constitutional monarchy, but they also recognized gender equality, established the Berber language as an official language on a par with Arabic, and ascertained human rights as a core principle of the country. Under the new constitution, the King appoints the Head of Government from the political party that won the elections to the House of Representatives and based on the results. The powers of the Head of Government have also been extended to include, among other things, the right to ask the King to dismiss one or more members of the Government.

Photo 4: Medina, Rabat



Photo credit: ECE EPR Team

Legislative power is vested in both the Government and the bicameral parliament. The legislature consists of two chambers: the House of Representatives and the House of Councillors. The House of Representatives has 395 members directly elected for a five-year term through a multi-member proportional representation system. Of this total, 305 seats are to be filled in 92 constituencies of 2 to 6 seats according to their population, plus 90 seats to be filled in 12 constituencies of 3 to 12 seats corresponding to the regions. The lists of candidates for these 60 regional seats must be composed of at least one third women, including the first and second places on the list. For all the constituencies, the lists of candidates are closed,

without any mixture or preferential vote. After the votes have been counted, the distribution is based solely on the electoral quotient, calculated on the basis of the total number of people registered on the electoral lists, and not on the number of votes cast, as was the case before 2021. The House of Councillors has 120 members, elected indirectly for a period of six years. Of these, 72 members are elected at the regional level, 20 by an electoral college of professional organizations, 8 by an electoral college of employers' associations and 20 by an electoral college of employees.

Administratively, Morocco is divided into 12 regions composed of 13 prefectures (mostly urban) and 62 provinces (mostly rural). In addition, each prefecture/province is subdivided into communes, some of which are also subdivided into arrondissements. The most recent reform of advanced regionalization, adopted in 2015, aims to establish a long-term territorial dynamic based on a rebalancing of competencies and resources between the central State and the local authorities, and to promote the bringing together of public policies and inhabitants. This dynamic was consolidated by the adoption of Decree No. 2-17-618 on the National Charter of Administrative Decentralization on 26 December 2018, and the holding of the first national conference on advanced regionalization in December 2019. These have seen the signing of the framework for the implementation of the exercise of powers of the regions, between members of the Government and the 12 presidents of regional councils of the country.

Morocco has also embarked on a decisive process to solidify the rule of law and institutions by embarking on a major comprehensive and in-depth reform of its judicial system. Through this process, Morocco aims to harmonise its legislation and its judicial system to bring it into line with international standards in terms of judicial independence. This reform process has been concretized at the legislative level by the adoption of several pieces of legislation, the most significant of which is the 2011 Constitution, which enshrines the principle of separation of powers and establishes the essential mechanisms of judicial independence.

In accordance with the provisions of the Constitution, Organic Law No. 100-13 on the Supreme Council of the Judiciary, which was promulgated by Dahir, allowed for the creation of an independent Supreme Council of the Judiciary that replaces the Supreme Council of the Judiciary and ensures the application of the guarantees granted to magistrates, in particular about their independence, appointment, promotion, retirement and discipline.

PART I
ENVIRONMENTAL GOVERNANCE AND
FINANCING

Chapter 1

LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

1.1 Legal framework

The 2011 Constitution of Morocco defines the country as a “constitutional, democratic, parliamentary and social democracy”. The Constitution protects certain fundamental rights and freedoms of a civil, political, economic, social, cultural and environmental nature, which men and women enjoy equally. It declares that the State, public institutions and local authorities are working to mobilize all the means available to facilitate equal access for citizens to the conditions allowing them to enjoy their rights, including access to water and a healthy environment, and sustainable development. Further, the State is working to achieve equality between men and women.

The legal system combines civil and Muslim law. The monarch exercises his powers by dahir, by which he may legislate by decree as well as promulgate laws passed by the bicameral parliament; parliament holds the remaining legislative powers. These latter powers cover laws in the domains of, among others: town and country planning; rules on environmental management, the protection of natural resources and sustainable development; and the water, forest and fishing regimes. Further, parliament may vote on framework laws concerning the fundamental objectives of the economic, social, environmental and cultural activity of the State.

In 2017, the cabinet (Government Council) passed a decree on regulatory impact assessment (Decree No. 2-17-585, implementing provisions of Organic Law No. 065-13 relating to the organization and conduct of the work of the Government and the status of its members). The decree requires that a bill be subject to an impact study, either before or after its preparation, by order of the Head of Government. There are exceptions for proposed organic laws (i.e., bills relating to the organization of administrative powers), proposed laws concerning the military and on finance, and bills that the Government submits, for opinion, to the Economic, Social and Environmental Council or certain other institutions. However, the 2019 SIGMA-OECD assessment of the service delivery area in Morocco against the Principles of Public Administration¹⁴ noted that these provisions

had yet to be put into practice, with the exception of four regulatory impact assessments which were carried out and concerned PCBs, access to genetic resources, aquaculture and the civil aviation code. The Government Council has observed that assessments are not carried out systematically, the procedure does not provide an explanation of the need for new legislation, the results of assessments are not routinely published and the House of Representatives lacks experts to undertake such assessments; to this end the Council has recommended amendment of the decree and the establishment of a Centre for Parliamentary Studies and Research within the House of Representatives, with the expertise and skills necessary to conduct studies on the financial, economic, social and environmental impact of proposed laws.

The SIGMA-OECD study notes that the General Secretariat of the Government (SGG) provides free access to the Official Bulletin (BO) as a scanned document on its website,¹⁵ which provides a basis for public access to legislation. However, there is a delay in making legislation available in a searchable form and earlier legislation, consolidated texts and jurisprudence are absent. Nonetheless, the General Secretariat’s website offers a powerful search engine (which unfortunately does not access the latest editions) and provides access to draft legal texts distributed to members of the Government and minutes of meetings of the Council of Ministers and the Government Council. Ministerial departments sometimes provide access to legislation on their own websites, but coverage is generally incomplete.

Environment laws

Since 2013, Morocco has continued the development of its national environmental legal framework apace, with major updates to its primary legislation on water (Law No. 36-15 of 2016), the coastal zone (Law No. 81-12 of 2015), and, most recently, on environmental assessment (Law No. 49-17, passed in July 2020). Forestry, protected areas and accidental pollution legislation have not seen major changes, while new laws on waste, climate change, and access to genetic resources and the fair and equitable sharing

¹⁴ www.sigmaweb.org/publications/Prestation-services-administratifs-Maroc-Juin-2019.pdf.

¹⁵ www.sgg.gov.ma.

of the benefits arising from their use are being developed or published, as the Decree No. 2-18-242 implementing certain provisions of the Law No. 22-07 on Protected Areas, published in May 2021. There is no legal framework on risks, nor on chemical safety. A swathe of regulatory improvements is being considered, with laws being drafted, including on protected areas and climate change.

Civil society representatives praise the Department of Sustainable Development for its openness in engaging different stakeholders in the development of legislation and strategy, for example in the elaboration of laws and regulations. Primary environmental legislation is generally strategic, even progressive; the weaknesses lie in subsequent regulations, implementation and compliance. Within the Department, different services are invited to provide their technical input to the drafting process that is led by the Legal Affairs Division. The SGG assures the formal consultation of other ministerial departments on draft legislation, though other mechanisms, such as national committees, provide for earlier consultation. However, this adds up to a heavy process for passing laws, which must be signed off by all ministers.

One severe difficulty identified with respect to environmental legislation is the frequent lack of implementing regulations over an extended period, resulting in legislation not being applied. Also, keeping track of subsidiary legislation – typically decrees – necessary for the application of provisions outlined in laws is a challenge. Each law typically requires 20–30 regulations, and there are frequent derogations and grace periods. The time taken to draft and adopt these regulations is not manageable given the multiplicity of stakeholders.

The 2003 Law No. 11-03 on the Protection and Conservation of the Environment has not been revised. However, the 2014 Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development (CNEDD) serves as a new framework, requiring the adoption of a number of legislative, institutional, economic, financial and other measures to further its objectives and principles. The Law's purpose is to:

- Strengthen the protection and conservation of resources and the natural environment, biodiversity and cultural heritage and prevent and combat pollution and nuisances;
- Integrate sustainable development into sectoral public policies and adopt a national strategy for sustainable development;
- Harmonize the national legal framework with international conventions and standards;

- Strengthen measures to mitigate and adapt to climate change and to combat desertification;
- Decide on institutional, economic, financial and cultural reforms in environmental governance;
- Define stakeholder commitments in matters of environmental protection and sustainable development;
- Establish an environmental responsibility regime and an environmental control system.

Specifically, in terms of legal reforms, the Law foresees, among other developments, the:

- Adaptation of the water legislation to the requirements of sustainable development and the combined effects of desertification and climate change;
- Updating of legislation to ensure the ecological balance of the forest and forest ecosystems and biodiversity, as well as the conservation of animal and plant species;
- Adoption of a targeted legal regime for the protection of soils against degradation and pollution and for optimal land use;
- Establishment of the legislative and regulatory framework governing hazardous products and genetically modified organisms (GMOs);
- Establishment of a legal regime relating to noise, light and odour nuisances;
- Updating of the waste legislation to strengthen aspects related to the reduction of waste at source, establish a selective waste collection system, promote waste recovery techniques and integrate the principle of extended producer responsibility and the ecological management of hazardous wastes;
- Revision of the legislative framework relating to environmental impact assessment (EIA), including the introduction of strategic environmental assessment (SEA);
- Establishment of rules for the prevention and management of natural and technological risks;
- Establishment of an environmental liability regime.

Besides the substantive areas to be covered by legislative developments, the Framework Law on the CNEDD foresees legislative and regulatory provisions for financial and fiscal incentives for environmental protection and sustainable development projects and research and development (R&D). It also expects legislative provisions on the rules of organization and operation, as well as the method of distributing the proceeds, of an environmental taxation system. The degree to which progress has been made in completing these legislative changes is assessed at the end of this chapter.

The National Sustainable Development Strategy (SNDD), adopted in 2017, recognizes that legislative gaps are impeding the transition to sustainable development and highlights sectors not covered by the law, obsolete regulations, reform projects unfinished and the lack of implementing regulations. Further, certain key laws on environmental protection need to be completed, strengthened or put in place. In addition, the Framework Law on the CNEDD states that the “legislative and regulatory arsenal must gradually cover all environments, resources and sectors of activity”.

Air

The period since 2013 has not seen a revision of the 2003 Law No. 13-03 on Combating Air Pollution. Nonetheless, several joint ministerial orders have been issued, for example:

- Decree No. 2-09-286 of 8 December 2009 setting the air quality norms to be respected and the organization of air quality monitoring,
- Decree No. 2-09-631 of 6 July 2010 setting the maximum emission levels from fixed pollution sources;
- Laying down the conditions for the approval of compression ignition engines intended for agricultural and forestry tractors as well as for non-road mobile machinery with regard to the emissions of pollutants from the engine (No. 3400-12, in 2012);
- Laying down the conditions and methods for calculating the air quality index (No. 1653-14, in 2014);
- Setting the information thresholds, alert thresholds and application procedures for emergency measures relating to air quality monitoring (No. 3750-14, in 2014);
- Fixing sectoral limit values for the release, emission or discharge of pollutants into the air from cement production facilities and cement production facilities practising waste co-incineration (No. 1504-18, in 2018);
- Setting the sectoral emission limit values for the release of pollutants into the air from activities in the ceramics sector (No. 2323-20, in 2020).

These joint orders are important in that they strengthen air emissions control and monitoring, while engaging ministries not directly responsible for environmental protection. For example, the then Ministry of Industry, Trade and Green and Digital Economy was involved in setting emission limits with industry and the Department of Sustainable Development; work is continuing with a similar order for the brick-making sector. The Department of Sustainable Development is

being supported by a European Union project to integrate PM_{2.5} emissions into the regulations and to revise limit values, among other activities. Further sectoral limit values are being negotiated with the industries concerned, such as the brick, steel, sugar industries, and Cherifien Office of Phosphate (OCP).

Climate change

The 2014 Framework Law on the CNEDD foresees strengthening measures to mitigate and adapt to climate change and to combat desertification. To this end, Decree No. 2-18-74 on the National Greenhouse Gas Inventory System was adopted in 2019. However, rules of procedure and plans still need to be adopted. In response to a request by the House of Representatives, the Legal Affairs Division of the Department of Sustainable Development is enhancing a law on climate change law that has been proposed by the House. A 2020 Decree No. 2-19-721 establishing the National Commission on Climate Change and Biodiversity was also adopted to strengthen the governance of climate policy.

Water

A new Law on Water (No. 36-15) was passed in 2016 to respond to the evolution of socioeconomic and climatic conditions in the two decades since the previous law (No. 10-95 of 1995) was passed and the promulgation of the new Constitution in 2011, which introduced the right to water and a healthy environment. In addition, the Framework Law on the CNEDD foresaw the revision of the Law on Water and the SNDD goal 73 requires the publication of implementing regulations in accordance with Law No. 36-15. The key gaps that were to be addressed by the new law were the inadequate legal framework for desalination, reuse of wastewater, recovery of stormwater and flood protection, lengthy procedures for the use of public waters, ambiguous terminology and unwieldy boards of water basin agencies (ABHs).

Among the many new provisions of the Law on Water are: the creation of water basin councils (CBHs), the requirement to draw up urban sewerage plans and equip urban areas with sewerage networks and wastewater treatment plants (WWTPs), the introduction of fees for discharges into these networks, a framework for participatory water resources management, a framework for flood prevention and protection, the guarantee of a minimum ecological flow from hydraulic structures, the establishment of a water information system and the clarification of definitions to support the polluter-pays principle. The Law requires the adoption of subsidiary legislation to implement its provisions, with 72 references to the

need for regulations; some, such as those on the ABHs (Decree No. 2-17-690), the High Council for Water and Climate (No. 2-18-233), establishing the National Water Plan (PNE) (No. 2-18-339) and Water Police (No. 2-18-453), have been issued.

The new Law on Water responds to the call in the Framework Law on the CNEDD to address the combined effects of desertification and climate change. It requires elaboration of the PNE and, for each water basin, master plan for integrated water resources management (PDAIRE), which define how water is to be shared. The PDAIRE master plans must take climate change into account, looking at impacts on both supply and demand. ABHs must also deal with climatic extremes, such as drought and flooding.

In late 2013, the Minister of the Interior, the then Minister of Energy, Mines, Water and the Environment, the Minister of Industry, Trade and New Technologies and the then Minister of Crafts issued three joint ministerial orders: No. 2942-13 fixing the general limit values for discharges into surface and ground waters, No. 2943-13 fixing the yields of wastewater treatment systems and No. 2944-13 fixing the characteristic quantities and the specific coefficients of pollution from industrial activities. The first came into effect in 2018 after a lengthy grace period. In mid-2014, the then Minister of General Affairs and Governance issued three orders (Nos. 2451-14, 2682-14 and 2803-14) fixing water sales prices and sanitation charges.

A Law on Dam Safety (No. 30-15) was published in 2016.

Biodiversity and protected areas

Since the adoption in 2011 of Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade, Decree No. 2-18-242 of 27 April 2021 was published, implementing certain provisions of the Law No. 22-07 on Protected Areas. However, the regulations for protected areas under this law are still pending. Ambiguity about the responsibility of the Department of the Environment for marine protected areas has delayed the process, but a decree is being prepared by the SGG. Therefore, the conservation of protected areas must rely on their status of being part of the forest estate. The basic forestry law remains that of 1917 (Dahir No. 1335), though a new forestry law is being developed.

The 2015 Decree No. 2-12-484 implements provisions of the 2011 Law. Its application is being pursued by the Department of Water and Forests and the Customs and Excise Administration, among others. There is no

legislation addressing invasive species, nor on biosecurity. A study is under way to identify gaps in the biodiversity-related legislation, in line with the National Biodiversity Strategy and Action Plan 2016–2020 (NBSAP).

In the marine sector, the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests has issued decrees for the sustainable management of the main fish stocks. These decrees set the fishing conditions in the main fisheries by implementing, depending on the case, measures for the limitation of effort and the protection of the sensitive phases of the stocks (management units, time–area closures, biological rest periods, total allowable catches, individual quotas, types of vessels and authorized gear). Other regulations set market sizes for fish species, prohibit fishing in artificial reef areas or in protected areas:

- Ministerial Order No. 3279 of 16 December 2010 setting the conditions of access to the small pelagic fishery in the South Atlantic;
- Ministerial Order No. 3049-19 of 8 October 2019 relating to the small pelagic fishery in the South Atlantic;
- Ministerial Order No. 4196-14 of 25 November 2014 relating to the North Atlantic–Mediterranean small pelagic fishery and the Central Atlantic small pelagic fishery, as amended and supplemented;
- Ministerial Order No. 2719-11 of 27 September 2011 relating to the prohibition of fishing for certain species of small pelagics, which was renewed by Order No. 1520-17 of 15 June 2017;
- Ministerial Order No. 1176-13 of 8 April 2013 regulating the fishing of swordfish, as amended and completed;
- Ministerial Order No. 1654-12 of 9 April 2012 relating to the temporary prohibition of fishing for certain species of shark, renewed by Order No. 1517-17 of 17 June 2017 relating to the temporary prohibition of fishing for certain species of shark;
- Ministerial Order No. 2095-20 of 28 July 2020 relating to the temporary ban on fishing for silky shark (*Carcharhinus falciformis*) and porbeagle (*Lamna nasus*) in Moroccan maritime waters;
- Ministerial Order No. 2707-20 of 9 November 2020 concerning the temporary ban on fishing for blue marlin (*Makaira nigricans*) and white marlin (*Tetrapturus spp.*) in Moroccan maritime waters;
- Ministerial Order No. 4195-14 of 25 November 2014 regulating the fishing of certain species of hake, as amended and completed.

The implementation of Decree No. 2-18-722 of September 2019 on fisheries development and management plans will strengthen management measures and adapt fishing effort in the various fisheries in order to preserve biodiversity and marine ecosystems and ensure the sustainable exploitation of fish stocks.

Waste management, chemicals, plastics and radioactive materials

The Government and ministries have continued to issue a plethora of implementing decrees and orders further to the 2006 Law No. 28-00 on Waste Management and Disposal, as earlier amended. These have addressed waste import and export (Decree No. 2-17-587 of 2018, and subsequent ministerial orders), management of hazardous waste (Decree No. 2-14-85 of 2015) and regional waste plans (Joint Ministerial Order No. 3413-11 of 2012). The law itself is now under review, as foreseen by the CNEDD.

Photo 1.1: Poster raising awareness on paper recycling in the ministry in charge of the environment



Photo credit: ECE EPR Team

The Government has also continued to legislate against plastic bags. Law No. 77-15, adopted in 2015, prohibited the manufacture, import, export, marketing and use of plastic bags; it was amended by Law No. 57-18 published in January 2020 what aims to stamp out the use in souks and by itinerant traders of banned bags obtained through illegal supplies. These laws were followed by implementing regulations, issued as joint orders by multiple ministries.

There are several regulatory texts governing the management of chemicals, but these texts are scattered among ministerial departments and are sometimes out of date.

There is no legal basis for the application of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), with just a voluntary norm in place, nor is there for a pollutant release and transfer register (PRTR). However, Morocco has certain legislative and regulatory provisions which provide for the traceability of discharges and transfer of pollutants, including Law No. 28-00 on Waste Management and Disposal, which provides in its article 37 that: “Generators hazardous waste and the persons holding the authorizations provided for in articles 30 and 35 keep a register in which they record the quantities, type, nature and origin of the hazardous waste they have produced, collected, stored, transported, recovered or eliminated, and communicate each year to the administration the information of this type corresponding to the past year.”

Law No. 142-12 on Nuclear and Radiological Safety and Security and the Creation of the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR), of 2014, provides a comprehensive legal framework for the management of radioactive materials and waste and for radiological monitoring, replacing legislation from the 1980s and earlier. A strategy sets out the process for the revision of the regulatory framework, including the adoption of the necessary subsidiary legislation to the 2014 law. A national committee to implement the strategy brings together ministerial departments and professional associations and has met nine times to date. Its work has resulted in, for example, the adoption of a regulation of radiological protection in category 2 installations in early 2021; a second regulation, related to the use of radioisotopes in medicine, is being drafted.

Coastal zone management

The first Environmental Performance Review (EPR) of Morocco observed a lack of adequate regulation of

the coastal and marine environment except for accidental marine pollution which includes the 1996 Decree No. 2-95-717 relating to the preparation and response to accidental marine pollution and 2003 Prime Minister's Order No. 3-3-00 implementing the Decree.

It recommended (Recommendation 1.4) finalization of the law on the development, protection, enhancement and preservation of the coastline and, once it was adopted by Parliament, ensuring its implementation through integrated coastal zone management (ICZM). Law No. 81-12 on the Coastal Zone, first prepared in 2006, was finally promulgated in 2015. It establishes the principles of ICZM, including the systematic consideration of the environment for all decisions affecting the littoral, and prohibits damage to the natural state of the seashore and unauthorized discharges polluting the coastline; it also defines a zone within 100 m of the coast in which construction is not permitted. Later in 2015, Decree No. 2-15-769 was adopted (published in the Official Gazette No.°6428 dated 07 January 2016) and which allowed to focus on the composition, competences and functioning modalities of the National Commission and the Regional Commissions of Integrated Coastal Management as well as on the modalities of elaboration of the National Integrated Coastal Zone Management Plan (PNL) and the regional schemes on the coastal areas (SRLs). The 2022 Decree No. 2-21-965 endorsing the PNL was published.

The first EPR also noted that the sea was being polluted by direct discharges of municipal and industrial wastewater. The Law on Water (No. 36-15) addresses the need for urban areas to be equipped with sewerage networks and WWTPs and the 2013 Joint Ministerial Order No. 2942-13 fixed limit values for discharges. Nonetheless, a draft decree on sectoral limit values for discharges into the coastal zone is being studied; another draft decree is being prepared on the extraction of sand and the marine part of the coastal zone. In general, while the adoption of the Law satisfies in part Recommendation 1.4 of the first EPR, implementing regulations for the coastal zone law are lacking. Recommendation 1.4 of the first EPR is partially implemented.

Environmental assessment and audit

The first EPR noted the lack of a legal framework for SEA and recommended (Recommendation 1.3) the adoption of the necessary legislation for its introduction. The Framework Law on the CNEDD also called for the integration of SEA into the legislation, as does the SNDD (goal 17). These calls were answered in July 2020 with the adoption of Law

No. 49-17 on Environmental Assessment. The new Law addresses not only SEA but also EIA and environmental audit.

Law No. 49-17 revises the legal provisions for EIA set out in Law No. 12-03 and will replace it once its implementing regulations have been published. This means, for example, that the list of projects subject to EIA remains the same as that annexed to the earlier law pending publication of a new list. Once in effect, the new law will introduce several important revisions to the EIA procedure:

- Not only new development activities will be covered, but also the dismantling, modification, relocation or extension of projects;
- A wider range of possible nuisances are to be considered, including noise, smell, light and heat;
- The environmental components that may be impacted are to be elaborated in greater detail;
- Impacts to be considered are those that are direct and indirect, permanent and temporary and in the short, medium and long term;
- Alternative solutions to avoid, reduce or compensate for impacts are to be presented;
- The EIA and environmental specifications (an environmental and health management and monitoring plan) must be produced by an approved design office;
- A system based on a simplified procedure: environmental impact statements (EISs) for projects having a more limited environmental impact;
- Sanctions will be introduced, including financial penalties and the possibility to order the cessation of activities.

In addition, the National Environmental Impact Assessment Committee was replaced by the National Commission for Environmental Assessment (CNEE) in 2020; the Regional Environmental Impact Assessment Committees had already been absorbed by the Unified Regional Investment Commissions (CRUIs) created by Law No. 47-18. The tasks of these bodies include the examination of EIAs and providing opinion on the environmental acceptability of investment projects. The National Commission handles projects of national scope, or having possible transboundary impacts, or whose implementation concerns several regions, with others being taken up by the regional committees. Both the Framework Law on the CNEDD and the SNDD (goal 18) call for further development of the legislation on EIA. The passing of Law No. 49-17 responds in part to this call. Some sectoral laws include provisions for EIA, such as Law No. 27-13 on Quarries and Law No. 33-13 on Mines.

Photo 1.2: Entrance Hall of the ministry in charge of the environment

Photo credit: ECE EPR Team

The Law on Environmental Assessment also brought in accreditation of consultancy companies undertaking EIAs, whereas previously they were covered by the accreditation of consultancy companies undertaking general studies. Accreditation is carried out by the Ministry of Equipment and Water and tough sanctions for consultancy companies that break the law are possible.

Law No. 49-17 sets out the requirement for an environmental audit, undertaken by an approved design office, for all activities covered by the new law that do not already have an environmental acceptability decision. Such a decision is the outcome of the EIA procedure. The audit provision therefore targets those (industrial) activities that were begun prior to the 2003 law on EIA, or otherwise avoided the EIA procedure, so as to create a level playing field for competing industries. The environmental audit report is sent to the administration to obtain an environmental compliance decision for the industrial unit or activity concerned. The compliance decision is accompanied by environmental specifications – the management and monitoring plan. The audit provision is therefore only expected to be applied over a limited period and will cease to be used once historic activities are brought into conformity. Operators are obliged to

carry out an environmental audit of their industrial units and activities within a maximum of five years.

Sustainable development

The Constitution recognizes sustainable development as a right of all citizens. Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development provides a legal basis for the principles, rights, duties and obligations contained in the 2011 Constitution and requires the adoption of the SNDD within a year (finally adopted by the Government in 2017), besides stating that sustainable development is a fundamental value to be integrated into all activities of society. The SNDD itself (in its goals 14–16) calls for the completion of legislation that contributes to sustainable development (orders and decrees), its publication and expansion. The legal framework has continued to develop in support of the institutional and policy steps being taken. For example, the Decree No. 2.19.452 was passed in 2019 on the organization of the National Commission on Sustainable Development.

The National Commission on Climate Change and Biodiversity (Decree No. 2-19-721 of April 2020) was established to better steer the national climate policy and the drafting of a climate law that is currently being

finalized. This Commission is to strengthen the consultation and coordination for the implementation of the national policy on the fight against climate change and the preservation of biological diversity. Chaired by the Department of Sustainable Development, it includes two subcommissions: one on climate change and one on biological diversity.

Besides the Framework Law on the CCNEDD, there is no dedicated legislation on sustainable development and green economy.

Environment-related provisions in sectoral legislation

The SNDD foresees improvements in sectoral legislation. For example, in the urban environment, goal 69 of the Strategy foresees the preparation of a framework law on standards to be respected during the preparation of town planning documents (e.g., public facilities, green spaces), whereas goal 70 foresees legislation on the integration of means of preserving urban biodiversity into urban policies. No information was made available on the legal framework related to environmental protection and sustainable development in several economic sectors, such as transport, housing, tourism and leisure, and spatial planning.

Energy

Since 2013, the 2010 Law on Renewable Energies (No. 13-09) was amended by Law No. 58-15. The amendments introduce a requirement to consult the relevant ABH when authorizing an installation based on hydraulic energy; the main aims, though, were to increase the power limit for hydropower projects, allow the sale of excess electricity and open the low-voltage electricity market. Subsequently, a proposed law, No. 40-19, further amending Law No. 13-09, was subject to public inquiry as recently as March 2020 but has yet to be adopted. Goal 44 of the SNDD anticipates the publication of decrees and implementing text of Laws No. 13-09 on Renewable Energies (2010) and No. 47-09 on Energy Efficiency (2011). In 2016, Law No. 48-15 on the regulation of the electricity sector and the creation of the national electricity regulatory authority was adopted, followed by Law No. 37-16 modifying and supplementing Law No. 57-09, which established the Moroccan Agency for Solar Energy (MASEN).

Industry and mining

Since 2013, the legislative framework for industrial emissions and pollution has not evolved, besides the updates to environmental laws and regulations.

In 2015, Law No. 27-13 on Quarries was adopted, specifically to address shortcomings in the quarrying sector that had led to negative effects on the population, the natural environment, infrastructure and financial income. The Law requires the drawing up of regional quarry management plans that must comply with legal provisions on “public health and safety, town planning, the environment, the protection of nature, historical monuments and cultural and human heritage, preservation of fish species and their habitats, conservation of forest, hunting and fish resources and their exploitation, protected areas and plant and animal species, agricultural development and logging.” The procedure for establishing and reviewing regional quarry management plans and their approval is set by decree, though no such decree has been adopted. The Law also explicitly requires the EIA of all types of quarries, with public works quarries subject to a simplified procedure. Operators must submit annual reports on the environmental conditions, though, again, the necessary implementing regulations have yet to be adopted. Marine dredging is forbidden in waters less than 20 m deep.

Also in 2015, a new Law on Mines (No. 33-13) was adopted (in line with SNDD goal 50). Among its provisions are that the holder of mining exploration rights must submit at least annually a report that includes a description of the state of the environment of the exploration site. The holder of a mining licence is required to undertake activities in accordance with the laws and regulations in force in terms of health, hygiene, safety and environmental protection and, in the event of an incident, to take immediate measures necessary to protect human life and the environment. Further, the licence holder must take out an insurance policy to cover its civil liability. Moreover, the holder of a mine operating licence is required to prepare an environmental impact study.

The 2016 Decree No. 2-15-807 on the procedure for granting mining titles, further to Law No. 33-33 on Mines, states that a request for conversion of an exploration permit into a mining operating licence must be accompanied by an EIA and decision on the mine’s environmental acceptability. In 2016, Law No. 74-15 on the Tafilalet and Figuig Mining Region was adopted to restructure the artisanal mining in this area, opening it to private operators while giving priority to artisanal miners in obtaining mining titles.

The SNDD goal 52 foresees promulgation of a law governing the use of chromium in manufacturing processes, though none has been prepared to date.

Agriculture, apiculture and forestry

In 2013, Law No. 39-12 on the Organic Production of Agricultural and Aquatic Products was adopted. One of the primary purposes of the Law was to “participate in the conservation of the environment and the preservation of biodiversity”. The use of mineral fertilizers and synthetic pesticides is forbidden in organic production. In 2014, two decrees were passed in support of the primary legislation: the first (No. 2-13-358) operationalizes the National Commission for Organic Production, on which the departments in charge of the environment and of water are represented; the second (No. 2-13-359) details how the Law is to be implemented. The Commission is chaired by the Minister of Agriculture or his/her representative. Its secretariat is provided by the Directorate for Development of Production Sectors of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests. Other laws complete the legal arsenal: Law No. 34-18 on Phytopharmaceutical Products, adopted in 2020, regulating the use of pesticides; Law No. 53-18 on Fertilizers and Growing Media; as well as Law No. 113-13 on Pastoral Transhumance and the Development and Management of Pastoral and Silvo-pastoral areas.

No legislative changes have occurred in apiculture in the past 30 years.

The key legal instrument for the forestry sector remains Dahir No. 1335 of 1917 on the conservation and exploitation of forests, with no major changes since the first EPR of Morocco. The “Forests of Morocco 2020–2030” strategy proposes regulations, preparation of which is under way.

Fisheries

In fisheries, Law No. 15-12 on the Prevention and Combating of Illegal, Undeclared and Unregulated Fishing was adopted in 2014. The then ministry in charge of equipment presented a draft law No. 69-18 on pollution by ships in May 2019. Other laws complete the legal arsenal, such as: the law forming the regulation of maritime fishing, which has been amended and supplemented by Law No. 15-12, and decrees and orders for the implementation of the provisions of Law No. 15-12.

In an effort to control the capacity of fishing vessels, Law No. 59-14 and its implementing regulations set the conditions for the refitting and reconstruction of vessels:

- Decree No. 2-18-722 on fisheries development and management plans, of September 2019;
- Decree No. 2-17-456 of 15 March 2018 applying certain provisions of the dahir bearing Law No. 1-73-255 of 23 November 1973 forming regulations on maritime fishing;
- Decree No. 2-17-455 of 26 April 2018 applying certain provisions of title I of Law No. 15-12 on the Prevention and Combating of Illicit, Undeclared and Unregulated Fishing and amending and supplementing Dahir No. 1-14-95 promulgating Law No. 1-73-255 of 23 November 1973 forming regulations on maritime fishing;
- Decree No. 2-09-674 of 17 March 2010 setting the conditions and modalities for the installation and use on board fishing vessels of a continuous positioning and tracking system using satellite communications for data transmission, as amended and supplemented by Decree No. 2-18-104 of 10 December 2018;
- Joint Ministerial Order No. 935-19 of 27 March 2019 setting out the list of ports in which foreign fishing vessels may conduct landing and/or transshipment operations of fishery products;
- Ministerial Order No. 690-21 of 16 March 2021 relating to the authorization of access to a Moroccan port by foreign fishing vessels and establishment of the inspection report;
- Ministerial Order No. 692-21 of 16 March 2021 concerning the control register of illegal, unreported and unregulated (IUU) fishing vessels;
- Ministerial Order No. 693-21 of 16 March 2021 establishing the model of the statement of offence provided for in article 32 of Law No. 15-12.

Culture

The draft of the recasting of Law No. 22-80 relating to the protection of the tangible and intangible cultural heritage has been being promulgated since 4 May 2021. It takes into consideration the new definition of cultural and natural heritage, including natural heritage, underwater heritage and mixed heritage (natural or cultural), presents articles relating to the protection of monuments and unclassified sites and provides for sustainable development.

The Department of Culture has established measures to ensure the protection and conservation of movable, immovable and intangible cultural property and natural property of the coast, in particular through the effective implementation of the World Heritage Conventions.

Health

There is no law on public health and the existing Framework Law No. 34-09 on the Health System and the Provision of Health Care, which remains the main legislation for the health sector, has limited provisions on preventative health care.

Other relevant legal acts

As foreseen by the 2011 Constitution, Law No. 31-13 on the Right of Access to Information was finally adopted in 2018. As also foreseen by the Constitution, the legal framework for administrative powers at subnational levels was revamped in 2015 with new organic laws on the regions (No. 111-14), prefectures and provinces (No. 112-14) and municipalities (No. 113-14), plus a decree on decentralization (No. 2-17-618). Each law sets out the conditions for democratic management by the local authority of its affairs, competencies and financial resources and regime, among other matters.

1.2 Policy framework

Environmental policy documents

At the time of the first EPR of Morocco, the country lacked a national strategy or action plan on the environment. Since then, Morocco has put in place a comprehensive policy framework with, as its foundation, the 2011 CNEDD, enacted in legislation in 2014, and the SNDD adopted in 2017 (figure 1.1). The adoption of the Strategy and the Framework Law on the CNEDD responds to Recommendation 1.2 (a) of the first EPR: “Further promote the development of a National Strategy on Environment and National Strategy on Sustainable Development, and their submission to the Government for adoption”.

The Charter, having a legal basis, sits above strategies, which are above plans of action, which, in turn, are above programmes that lead to action on the ground.

The budget received by the then department in charge of the environment was split, in 2020, between operational costs and two programmes: on the consolidation of environmental and sustainable development governance and stakeholder mobilization; and on the preservation and valorization of the environment and the promotion of the transition towards a green economy. The latter programme is distributed among projects under the following

subordinate programmes: the National Shared Sanitation Programme (PNAM) (69 per cent); the National Household Waste Programme (PNDM) (23 per cent); the Pollution Prevention and Control Programme for the Industrial and Artisanal Sectors (1 per cent); and the Programme for the Protection and Enhancement of Environmental Media (7 per cent). A small amount is allocated to the Programme on Integrated Coastal Zone Management.

National Charter for the Environment and Sustainable Development

The CNEDD (2014 Framework Law No. 99-12) sets out a series of values and principles relating to: sustainable development; environmental integration; public participation; R&D; the protection and enhancement of natural and cultural heritage; responsible operating, production and consumption methods; and the principles of prevention, precaution and polluter pays. It also sets out environmental rights and duties and commitments by public authorities, local communities, economic operators and civil society. The commitments by public authorities include the strengthening or, “where necessary, the establishment of institutional mechanisms that act in a concerted and coordinated manner, as well as the financial resources required for the implementation of the integrated national policy for the protection and enhancement of the environment and sustainable development resulting from this Charter”.

Air quality

The National Air Programme for the period 2018–2030 (PNAir) was adopted in 2017 by the Standing Committee on Air Quality Monitoring and Surveillance. The first phase of the PNAir (2018–2021) involves the strengthening of the air quality monitoring network, organization of regional committees, production of national and regional reports, drafting of regulations and other urgent tasks. This phase has resulted in joint orders setting emission limit values and initiation of a strengthening of the monitoring network. Given the importance of air quality monitoring, the first part of the PNAir has been broken down into a specific programme: National Air Quality Monitoring Programme (PNSQA), which aims to reach 140 air quality stations by 2030. Between 2020 and 2022, 61 stations to be acquired are targeted and 50 stations to be acquired between 2026 and 2030.

Figure 1.1: Policy and legal milestonesWater

Law No. 36-15 and Decree No. 2-18-339 together provided a framework for the General Directorate for Water (DGE) to elaborate the PNE for the period 2020–2050, which was launched in 2020 as a follow-up to the priority water programme. The PNE, together with the National Drinking Water Supply and Irrigation Programme 2020–2027 (PNAEPI), provides a framework for further dam building; in combination with PDAIREs, it defines how water is to be shared in the period to 2050. PDAIREs are being developed for each water basin in the country, considering climate change. These documents also provide the basis on which the National Office of Electricity and Drinking Water (ONEE) can plan the water supply.

The PNAM, adopted in 2018 for the period to 2040, brought together the earlier National Rural and Urban Sanitation Programmes and a programme on treated wastewater. By 2019, the earlier programmes had succeeded in connecting water supplies to 76 per cent of the 260 targeted urban areas, against 70 per cent in 2005 and a target of 80 per cent in 2020; while wastewater treatment reached 56 per cent in 2020 *60 per cent was the target for 2020). However, half the country's population live in rural areas.

The Shared Programme therefore aims to accelerate the roll-out of water supply and sewerage networks to reach 95 and 80 per cent, respectively, of the urban areas, as well as to the main towns in each commune (80 per cent and 60 per cent connection rates, respectively) and expand the reuse of wastewater in irrigation. Local development plans at the communal level include a sanitation component. The Shared Programme is state funded, with co-financing by operators. Progress reports for the Shared Programme and its predecessor programmes were prepared in the period 2006–2020 but are not made public.

The National Watershed Management Plan 1996–2016 resulted in erosion control works over 1.7 million ha (exceeding the planned 1.5 million ha) over a 20-year period in 22 priority watersheds. Terms of reference for updating the Plan have been drafted but not finalized.

Waste and chemicals

The PNDM was adopted in 2007 with targets set for 2022 and three phases: an initial, integration phase (2008–2012); a second, ramping-up phase covering governance, institutional and financial sustainability, improved environmental and social performance and the development of value chains; and a final, generalization phase. The latest results date from 2021 and indicators do not correspond closely to the quantified targets. Each province has a waste master plan. Local development plans at the communal level include a waste component.

As a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Morocco has produced a national dangerous waste plan.

Similarly, as a party to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention on Persistent Organic Pollutants, Morocco has a national strategy on chemicals (2007) and Guidelines on Good Practices for the Sound Management of Chemical Products in Industrial Environments (2014).

Nature protection

The NBSAP for the period 2016–2020 was elaborated under the Convention on Biological Diversity (CBD). The postponement of the 15th Meeting of the Conference of the Parties to the Convention from 2020 to 2021, due to the coronavirus pandemic, has delayed the adoption of the global biodiversity framework and consequently the updating of the NBSAP for 2020 to 2030. The biomonitoring programme (foreseen by SNDD goal 114) is provided through the Regional Information Systems for the Environment and Sustainable Development (SIREDDs). For protected areas, managed under the Department of Water and Forests, the Protected Areas Master Plan of 1995 remains valid. It is complemented by a series of 10-year plans for each individual protected area, with funding coming either from the State budget or donors.

The priorities of Forests of Morocco 2020–2030 include improving the organization of hunting to preserve wildlife, improving 10 national parks and promoting ecotourism. The strategy is expected to support the restoration of habitats and recovery of endangered species. The National Strategy for the Creation and Management of Marine Protected Areas (MPAs) remains that adopted in 2012. The National Strategy for the Development of Protected Areas for Fisheries aims to protect fisheries but is being brought into line with the protected areas system of the International Union for Conservation of Nature (IUCN) (category VI: protected area with sustainable use of natural resources). There is no strategy or legislation on invasive species.

Climate change and desertification

The CNEDD provides the main framework for action on climate change, in combination with the country's international commitments, notably the Nationally Determined Contribution (NDC) under the United Nations Framework Convention on Climate Change (UNFCCC). The Intended NDC was submitted in 2015 with a planned reduction in greenhouse gas (GHG) emissions of 42 per cent; it was revised as the NDC in 2016 with a reduction of 44 per cent. The updated NDC submitted to the UNFCCC Secretariat in June 2021 revises the targets of the first NDC upwards and proposes a GHG emissions reduction target of 45.5 per cent by 2030 compared with the business-as-usual (BAU) scenario. This target includes 18.3 per cent of unconditional reductions. Preparation of the NDC involved stakeholders including non-governmental organizations (NGOs). The NDC was complemented in 2018 by an implementation report, an implementation roadmap and an investment and funding plan. "Morocco Vision 2050" is being elaborated for the 26th session of the Conference of the Parties to the UNFCCC (November 2021) to provide a policy framework for a low-carbon future, focused on six key sectors. "Morocco Vision 2050" has been reviewed by the National Commission on Climate Change and Biodiversity, which will be responsible for follow-up, and is based in part on national sectoral workshops involving industry. In 2014, a climate change policy was published to provide an operational framework for the development of a medium- and long-term strategy and to provide a basis for the coordination of the various measures and initiatives undertaken to combat climate change. The National Climate Plan for the period to 2030 (PCN) was prepared in 2016 and has been followed by seven regional plans to date; the remaining regional plans are expected to be produced in 2021–2022 with the support of the World Bank.

An updated National Action Programme to Combat Desertification (PANLCD) was published in 2013. It introduced a more tailored ecoregion approach and strengthened monitoring and evaluation.

Coastal zone

The PNL was elaborated, validated by the National Commission on Integrated Coastal Zone Management in 2020, and adopted by the Government Council May 5, 2022, and its approval decree was published in June 2022. A strategy has also been drafted. Nine regional schemes on the coastal areas are to follow, with that for the Rabat region being prepared as a pilot exercise, but not yet adopted by the regional commission of coastal zone (the development of the national and regional plans correspond to SNDD goals 94 and 95). Meanwhile the Programme on Integrated Coastal Zone Management and the National Emergency Plan for the Preparation and Fight Against Accidental Marine Pollution are led by the Department of Sustainable Development, as a framework for related activities and projects. The latter includes carrying out simulation exercises every two years with all the different services concerned to strengthen the capacity of all stakeholders to respond to marine pollution incidents.

Culture

The project of the national charter of preservation, protection and development of cultural heritage completes the project of revision of Law No. 22-80 and is in line with current social, economic and cultural development.

Sustainable development and green economy policy documents

This section examines key policy documents on sustainable development and green economy not covered under environmental and sectoral policies, including the SNDD, the INDH, sectoral Sustainable Development Action Plans, the Exemplary Administration Pact (PEA) and two circular economy frameworks: the National Framework Plan for Sustainable Consumption and Production and the National Strategy for Waste Reduction and Recovery.

National Sustainable Development Strategy

The SNDD is based on four principles: international compliance; compliance – or coherence – with the principles of the CNEDD; stakeholder engagement; and an operational strategy, meaning that it offers continuity with existing plans and programmes. This strategy aims to accelerate Morocco's transition to a

green and inclusive economy by 2030. It notes the need for sectors to integrate socioenvironmental components more thoroughly into their strategic roadmaps. It therefore aims to decouple economic growth from pressure on resources, while creating green jobs in the environment sector. The SNDD sets out seven priority issues, 31 strategic directions and 137 goals. The Strategy addresses a set of seven issues, four of which are environmental (figure 1.2). These issues cover: (1) consolidating the governance of sustainable development; (2) achieving a successful transition to a green economy; (3) improving the management and development of natural resources and enhancing biodiversity conservation; (4) accelerating the implementation of the national policy against climate change; (5) paying special attention to sensitive areas; (6) promoting human development and reducing social and local inequalities; and (7) promoting a culture of sustainable development. In transitioning to a green economy, strategies are foreseen for sustainable agriculture (“Plan Maroc Vert” – Green Morocco Plan (PMV), since replaced by Generation Green 2020–2030), fisheries (Strategy Halieutis, again, since replaced), forestry, industry, the energy transition, mining, crafts, mobility and urban planning, green industrial sectors, reconciling tourism with environmental protection (“Vision 2020”), integrated waste management to implement a circular economy, and urbanism.

To improve natural resources management and strengthen biodiversity conservation, the SNDD is focused on water resources, soils (with a new law planned) and biodiversity protection and conservation. In relation to biodiversity, it foresees national strategies for biodiversity and for the development of MPAs, a bio-monitoring programme and, as its goal 80, strengthened policies for the conservation and rehabilitation of biodiversity and sensitive areas.

When it comes to accelerating the implementation of the national policy to combat climate change, the focus is on improving governance, notably through local ownership of local plans on combating climate change, the engagement of the local level in the fight against climate change (the National Plan to Combat Climate Change and a planned national plan for the prevention and response to climate risks) and seizing climate finance opportunities. Finally, among the more environmental issues covered by the SNDD is the intention to pay particular attention to sensitive areas: the coastal zone (with PNL and SRLs), oases and deserts (with protection plans) and mountainous areas (including natural resource conservation programmes). In addition, education for sustainable development (ESD) is identified as a priority, alongside scientific research.

Figure 1.2: Seven issues of the SNDD



The SNDD has been translated into a series of sectoral Sustainable Development Action Plans, together with a cross-cutting PEA, which is seen by the SNDD as a lever for sustainable development. An evaluation of the SNDD was carried out in 2021 to consider new developments at national and international level.

National Initiative for Human Development

The INDH was launched in 2005 with the aim of socioeconomic development in the spirit of leaving no one behind. A third phase of the Initiative, for the period 2019–2023, aims to consolidate progress made and overcome barriers to further progress, while expanding coverage nationally from the few communes addressed in the first two phases. It comprises four programmes: catching up on deficits in basic social infrastructure and services (including environmental services); support for people in precarious situations; income improvement and economic inclusion of young people; and building the human capital of younger generations.

Sustainable Development Action Plans and the Exemplary Administration Pact

The implementation of the SNDD is done through the monitoring of 28 Sustainable Development Action Plans (PADDs) and through the PEA which encourages the public administration to lead by example and deploy an eco-responsible approach to encourage and promote good sustainable development practices among all economic and social players at the national level.

The PEA was formed around six strategic objectives which aims to generalize environmental approaches within public buildings; include public administrations in the logistics of waste management and recovery; to strengthen the initiatives of a “responsible employer State”; integrate a participatory approach and improve transparency; promote sustainable and responsible public procurement; and develop the model of public actors in terms of mobility. To operationalize the PEA, several actions have been undertaken, in particular:

- A methodological guide and orientation sheets constituting a toolbox were developed and made available to ministerial departments;
- The adoption of the PEA and its methodological guide during the first meeting of the Strategic Committee for Sustainable Development held on 22 February 2019;
- The Circular No.08/2019 of the Head of Government to all public administrations encouraging them to draw up an environmental audit of their buildings and to propose a

Ministerial Plan for Exemplarity of the Administration;

- The introduction of a new section in the Hassan II Prize for the Environment dedicated to the administrations that have achieved the objectives of the PEA;
- The decision to introduce green vehicles in the public administration fleet to reach at least 10 per cent of new acquisitions from 2019.

The information on the state of progress of the SNDD indicators provides the mechanism through which the SNDD is implemented. This is carried out by the sustainable development focal points through an information system set up in the form of an interministerial interface and through the elaboration of an annual report which is presented to the members of the Committee for Monitoring and Support of the SNDD.

National Framework Plan for Sustainable Consumption and Production

The National Framework Plan for Sustainable Consumption and Production began in 2015 and was published in 2016, with the support of the United Nations Environment Programme (UNEP) and the European Union. The Plan has seven strategic directions: anticipate economic changes and changes in behaviour linked to ecological transition; encourage national companies to engage in a sustainable production process; support the development of green sectors; encourage a circular and low-carbon economy approach; set up eco-labelling and environmental certification systems; promote ecologically responsible consumption patterns; and develop information and awareness programmes. A roadmap on sustainable consumption and production is being prepared.

National Strategy for Waste Reduction and Recovery

To manage waste and establish a circular economy, Morocco adopted the National Strategy for Waste Reduction and Recovery (SNRVD) in March 2019 for the period to 2030, in line with the SNDD. Its vision is to initiate circular economy practices at the local level by developing waste recovery channels that create green jobs. This vision is to be realized through actions in several strategic areas under two main objectives: reduce the waste to be disposed of in controlled landfills and improve the recycling recovery rate; and create sustainable green jobs. The Strategy includes numeric targets and is complemented by the PNDM and National Programme for Waste Recovery (PNVD) for the

period to 2030; the latter programme provided the basis for the preparation of the Strategy. The PNVD aims to establish legal, technical and financial pillars for the reuse and recovery of waste, by:

- Promoting integrated and sustainable waste management;
- Reducing the waste of natural resources;
- Minimizing the impacts generated by industrial activities and upgrading national industry;
- Organizing waste recovery channels;
- Promoting investments and creation of jobs (organization of the informal sector).

It includes objectives to be achieved in terms of recycling and recovery of different types of waste by 2025 and 2030.

Sectoral development with a possible impact on the environment

The SNDD highlighted the policy framework related to environmental protection and sustainable development in several economic sectors through their respective PADDs, such as energy, mining, agriculture, transport, housing and spatial planning, and tourism.

Industry

The Funds for Industrial Depollution (FODEP), backed by Germany, target industrial pollution in general and resource efficiency, whereas the European Union-funded Voluntary Mechanism for Industrial Pollution Control targets industrial water pollution. Both funds are managed by the Department of Sustainable Development. The Industrial Strategy through Integrated Industrial Platforms addresses persistent organic pollutants (POPs). Another programme is tackling hydrochlorofluorocarbons (HCFCs), with quotas for industry and importers having been set in 2011 and subsequently tightened; demonstration projects and awareness-raising in different sectors and for different substances continue. The Pollution Prevention and Control Programme for the Industrial and Artisanal Sectors is the general industrial pollution programme of the Department of Sustainable Development.

Forestry

The National Forestry Programme (adopted in 1999) fixed the forestry policy until 2020. It was followed by two decennial programmes, for the periods 2005–2014 and 2015–2024. The current decennial programme is funded by the Government, in contrast with the previous one, and has six main tracks: combating

desertification; restoration of forest ecosystems; conservation and enhancement of biodiversity; conservation of the lands of the forest domain; economic valorization of forest ecosystems; and governance. Forests of Morocco 2020–2030 was launched in 2020 (at the same time as the new agriculture strategy, Generation Green 2020–2030). The forestry strategy includes several priorities, including the strengthening of a participatory approach to forestry. It also includes an afforestation programme that starts with planting 50,000 ha per year, rising to 100,000 ha per year by 2030. Each forest region has its own 10-year operational master plan. The Department of Water and Forests is also responsible for implementation of the Forest Fire Prevention and Control Master Plan, in cooperation with numerous partners.

Fishery

The previous Fisheries Strategy 2009–2020 – Strategy Halieutis – included environmental provisions. It has led to strengthening research and the establishment of 20 management plans for the main commercially important fisheries, each through the promulgation of an order (e.g., small pelagics, hake, shrimp, seaweed, shellfish, swordfish, shark and bluefin tuna). These orders set out management measures for the respective stocks, fishing periods, equipment, fishing areas, vessel types and gear.

The new strategy, which is to be finalized, is a continuation of the actions undertaken, but will add a new element to the “blue economy”. It includes provisions for MPAs in order to achieve the Aichi Biodiversity Target of 10 per cent of the marine environment to be protected, which has not yet been reached. The existing MPAs are MPAs for fishing purposes. Fishing is allowed in these protected areas and the first three of them are reserved for artisanal fishers who exploit them according to the co-management plan.

Health

The then Ministry of Health issued its “Health 2025” plan in 2018. It reportedly includes measures on environment and health though none are listed in the plan’s 125 actions. The Ministry’s Environmental Health Division implements an annual workplan on the environment and health.

Disasters

The National Strategy of Natural Disaster Risk Management, 2020–2030 was drafted in 2019 following interventions by the World Bank and OECD

and an earlier programme on the management of the risk of natural disasters initiated in 2016. The Strategy's adoption was delayed by the pandemic until early 2021, when it was presented to the Government Council. Besides the risk of natural catastrophes, the Strategy covers industrial, technological and health risks. Its implementation involves many departments, each having a focal point for risks. The National Action Plan (2020–2030) has three objectives: knowledge building; prevention and preparation; and intervention, reconstruction and recovery. Regional plans are foreseen but have yet to be developed. A fund for recovery and reconstruction was established in 2009, with funds being made available for the management of risks since 2015. In the period 2015–2020, more than 200 projects were financed, costing about 3 billion dirhams.

1.3 Strategic environmental assessment

Recommendation 1.3 of the first EPR was the adoption of the necessary legislation for the introduction of SEA. This was fulfilled in part by the adoption of Law No. 49-17 on Environmental Assessment, which also satisfied a provision in the Framework Law on the CNEDD on integrating SEA into the environmental legislation. The new Law requires that draft policies, programmes, strategies and sectoral and regional plans and schemes drawn up by the State, local authorities and public establishments be subject to SEA. The SEA is carried out by the authority that is responsible for the policy, programme or plan.

However, the list of policies, programmes and plans has yet to be drawn up in a regulation; similarly, the required procedures for developing, reviewing and modifying SEA have to be regulated. These application texts as well as the reference documents, notably the directives, are being finalised and will be completed during 2022. The promulgation of the application texts requires, beyond the country's political will, synergy with the various administrations concerned and coherence with the various related legal texts. Recommendation 1.3 of the first EPR has been partially implemented.

1.4 Sustainable Development Goals

Overall framework for implementation, follow-up and review

National consultations on the post-2015 period, were carried out in 2013 and 2014. The results of these consultations, led by the High Commission for Planning (HCP), with the support of the United

Nations system, have enriched the national MDG (Millennium Development Goals) assessment report.

In July 2016, the then Ministry of Foreign Affairs and Cooperation presented to the High-level Political Forum on Sustainable Development a report on the first measures taken to implement the 2030 Agenda for Sustainable Development, further to national consultations held 3–5 May 2016, which involved about 500 stakeholders, close to 200 of whom were non-state participants; radio and social media (#MarocODD) were also used for outreach. That report identified the main directions for implementation of the Sustainable Development Goals (SDGs): broadening ownership of the SDGs; aligning the SDGs with national priorities (or vice versa); coordination of public policies; a statistical information system; monitoring and evaluation; and finance. The report also noted the difficulty of obtaining data to calculate environment- and governance-related indicators. According to Morocco's voluntary report submitted in 2016, the national statistical system can produce: 63.2 per cent of all level I indicators, 40 per cent of level II indicators and 30.8 per cent of level III indicators. Currently, taking into account the latest classification established by the group of experts in charge of the indicators related to the SDGs, the diagnosis updated by the HCP shows that the national statistical system as a whole can produce 117 out of 230 SDG indicators, i.e., 51.5 per cent.

The National Commission on Sustainable Development provides a permanent institutional framework for the 2030 Agenda and is expected to ensure coherence between SDG and SNDD processes nationally. With the Commission being chaired by the Head of Government and attended by ministers, this provides a powerful impetus for progress to be made. The Committee for Monitoring and Support of the Sustainable Development Goals is established within the National Commission for Sustainable Development and chaired by the Head of Government. The elaboration of the Voluntary National Reviews (VNR) on the SDGs is done by the HCP.

The National Commission receives yearly implementation reviews on the SNDD that allow monitoring the progress made by ministerial departments both in their PADDs and in the implementation of the PEA. The SNDD monitoring system provides clear information to the ministers, though it is not a public repository.

In June 2019, the then Ministry of Foreign Affairs and Cooperation and the HCP, with the support of the United Nations system in Morocco, organized a

national consultation to review progress since 2016, in preparation for the 2020 VNR. The 2020 VNR was presented in the margins of the 2020 High-Level Political Forum. The consultations involved representatives of the Government, parliament, the Court of Auditors, public institutions, the Economic, Social and Environmental Council, local authorities, universities, the media and NGOs.

The HCP handles data collection and coordination for the VNR. It invites all ministerial departments to attend preparatory workshops. Specifically, it led preparation of the draft VNRs, using its Statistical Database¹⁶ and reports by ministerial departments. The draft was then debated by the National Commission on Sustainable Development before adoption by the Government. Civil society consultation had to be organized online, due to the exceptional circumstances of the pandemic. It is described in some detail in the 2020 VNR.

A little less than half of the SDG indicators are produced by the HCP itself and a similar number are produced by other departments and supplied to the HCP; the remainder are the result of combining data from both sources. For example, the mortality rate attributed to household and ambient air pollution (SDG indicator 3.9.1) is calculated based on World Health Organization (WHO) estimates and studies undertaken by the then Ministry of Health. The HCP established a dedicated platform for SDGs in 2019,¹⁷ following a partnership agreement with UNDP and 10 United Nations agencies in Morocco to support national monitoring and reporting of the SDGs. In the same year, the HCP introduced a computable general equilibrium model (Sustainable Development Goal Simulations (SDGSIM)). The SDGSIM model is designed to conduct¹⁸ medium- and long-term development policy analyses, particularly those related to the 2030 Agenda.

A particular challenge is the calculation of indicators for environment-related SDGs, due to data quality and the lack of environmental data being collected regularly as series, rather than at a single point in time. More generally, the separate monitoring of the SNDD and SDGs does not facilitate policy coherence.

Nationalization of Sustainable Development Goals

There has not been an SDG nationalization process as such, but “relevant” SDG indicators have been

selected and, on occasion, proxy indicators have been used. In 2019, the then Department of the Environment published a diagnosis of the current situation in relation to the SDGs, as part of a larger study on the implementation and monitoring of the SDGs. This resulted in the retention of 149 SDG targets (of the total 169), prioritized according to four levels; these 149 targets have 221 indicators, 111 of which are produced using national sources (in 2019). The study also mapped the targets against government strategies, plans and programmes and the institutions responsible, which revealed many areas of cooperation. Forty-five of the targets retained were found not be addressed at all by the SNDD; this implies that 70 per cent of the targets are covered, though the study shows that this coverage is to varying degrees. This process will continue with the ongoing review of the alignment of the SNDD with the SDGs.

Cross-cutting issues, including means of implementation and partnerships

Morocco has adopted an SNDD, followed by sectoral Sustainable Development Action Plans and departmental contributions to the PEA. These support the implementation of the 2030 Agenda in the country.

However, at present, the SNDD is not perfectly aligned with the SDGs, which is unsurprising as its preparation began in 2013. This misalignment was recognized in the Strategy itself, which specifies that an evaluation of the various SNDD projects should lead to an adjustment phase allowing the monitoring of the achievement of goals and targets aligned with national priorities as well as the SDGs. Accordingly, an evaluation of the SNDD is under way in 2021 with the aim of aligning its goals completely with the SDGs. This exercise should integrate the two processes and strengthen the SNDD as a means of implementation of the 2030 Agenda.

In 2019, as part of the larger study on the implementation and monitoring of the SDGs, a report was issued by the then Department of the Environment on the development of an action plan to accelerate the process to achieve the SDGs. This report identified 20 accelerator SDGs and analysed the alignment of national strategies with SDG targets, highlighting that SDG 13 on climate action is poorly addressed by sectoral strategies. The report also analysed progress towards achievement of each SDG and recommended accelerated implementation of technical measures to support the SDGs, implementation of measures to

¹⁶ <http://bds.hcp.ma/sectors>.

¹⁷ http://plateforme-odd.hcp.ma/ODD_HCP/fr/.

¹⁸ <https://applications-web.hcp.ma/coherence-odd/>.

encourage synergies between departments, the updating of strategies that have expired and identification of a lead department for each SDG. The report's recommendations on governance have largely been acted upon, whereas uptake of the SDGs at subnational levels is work in progress. The report concludes with a proposal for a US\$4 million operationalization plan on popularization and ownership of the SDGs, integration of SDGs into planning documents, capacity development and coordination, monitoring and evaluation mechanisms.

Also, in 2019 and within the same study, the then Department of the Environment published an evaluation of the total budget necessary to finance the actions to be taken to achieve the SDGs by 2030: US\$111 billion, which is approximately the same amount as nominal GDP in the same year. The first EPR recommended (Recommendation 1.2 (b)) ensuring adequate financing of the environment and sustainable development strategies, which have been subsumed into the effort to achieve the SDGs. The study made a dozen recommendations on how to catalyse the necessary funds, beginning with channelling financial flows towards responsible investments compatible with the SDGs and creating synergy among the different funding processes. The study also emphasized the need to involve and empower all actors and redirect their efforts towards sustainable development, as the State cannot achieve the goals alone.

Awareness-raising on the Sustainable Development Goals

The HCP conducted a national survey on the perception of households on key SDG targets. This survey provided a better understanding of Moroccan citizens' perceptions and concerns in relation to key areas of sustainable development (poverty and social inequalities, health, education, decent employment, gender equality, environment, peaceful society and future prospects).

The HCP also organised, between 2017 and 2019, in collaboration with the wilayas and regional councils, three regional consultations, with a view to extending them to the rest of the country's regions. The consultations aimed to increase awareness and ownership of the SDGs by territorial actors and exchange information on the need to develop local statistics for monitoring the implementation of these goals.

Morocco also conducted a second national consultation in 2019 on the SDGs with all stakeholders, in preparation for the 2020 VNR.

Similarly, in 2020, a specific consultation with civil society was organised. The main objective was to highlight the efforts of the associative fabric with its different horizons, in participating in the implementation process and reporting on the SDGs.

For the exercise conducted in spring 2020, it consisted of surveys of businesses and households to assess the social and economic impact of the Covid 19 pandemic in Morocco. The results of these surveys were fed in part into the 2020 VNR.

Ministerial departments also carry out activities to raise awareness. For example, the then Ministry of Health presented the results of its studies on SDG indicator 3.9.1 to other departments at a webinar to raise awareness and encourage action (e.g., on transport emissions), though financing for action is unclear. As another example, the Partnerships Division of the Department of Sustainable Development has worked with other departments to raise awareness of SDG 12 on sustainable consumption and production.

Progress on the Sustainable Development Goals

Three SDG targets share the indicator, "Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies" (SDG indicators 1.5.4, 11.b.2 and 13.1.3). The respective goals and targets are:

- Goal 1 and its target 1.5 (a second priority target for Morocco);
- Goal 11 and its target 11.b (a target retained by Morocco);
- Goal 13 and its target 13.1 (a primary priority target).

The indicator as such remains at 0 per cent, because no regional government has yet prepared its regional disaster risk reduction (DRR) strategy. However, that does not give a complete picture as a national strategy has been adopted and a national action plan prepared. Morocco has yet to inform the United Nations Office for Disaster Risk Reduction of the adoption and implementation of its national strategy in accordance with target E1 of the Sendai Framework for Disaster Risk Reduction 2015–2030, or indeed any of the Sendai targets. Only the number of deaths and missing persons attributed to disasters, per 100,000 population, for the baseline period 2005–2014 and the decade 2012–2021 are available on the Sendai monitoring website.

SDG indicator 17.14.1 only obtained a methodology in September 2020. The methodology recommends that governments convene a stakeholder group for self-scoring.

A glance at the scoring table included in the methodology makes it clear that Morocco should score highly because of the country's high level of political commitment to sustainable development, its long-term strategy, the national committee and its more technical commissions and other subsidiary bodies, and the monitoring system. The country might achieve a higher score through, for example, through routine application of regulatory impact assessment with particular attention to sustainability, transboundary impact assessments, the nomination of an ombudsperson for future generations and the integration of financial information into the monitoring system.

1.5 Institutional framework

Sustainable development

One of the seven main issues addressed by the SNDD is the need to consolidate the governance of sustainable development. The SNDD recognizes that there are several institutional barriers to sustainable development, including a lack of planning, coordination and convergence in the implementation of strategies, lengthy procedures, overlapping responsibilities and difficulties in applying regulations at the local level. It therefore calls for the strengthening of the institutional framework for sustainable development and the role of the various actors. In addition, goal 7 is to strengthen the institutions responsible for sustainable development and improve their synergies and goal 10 is to institutionalize corporate social and environmental responsibility approaches and socially responsible investment.

Initially, a Strategic Committee for Sustainable Development was established in 2018 to oversee efforts to achieve sustainable development (Decree No. 2-17-655). The Committee first met in February 2019. However, it was replaced in June 2019 by the National Commission on Sustainable Development, by Decree No. 2-19-452, which defined the mission of the new body and gave it a broader composition than the Strategic Committee, adding the then Ministry of General Affairs and Governance, the HCP, associations of regional presidents, enterprises and banks, and two agencies. The National Commission is chaired by the Head of Government. The Decree also added two subordinate committees: the Committee for Monitoring and Support of the SNDD, chaired by the

Secretary-General of the Department of the Environment (at that time the Secretary of State for Sustainable Development), whose department also provides the secretariat; and the Committee for Monitoring and Support of the Sustainable Development Goals, chaired and serviced by the services of the Head of Government. The revision was deemed necessary by the Strategic Committee itself and by the Court of Auditors to ensure the implementation of the 2030 Agenda for Sustainable Development. The central role of the Department of Sustainable Development in the Committee dealing with the SNDD responds positively to Recommendation 1.1 (b) of the first EPR, to "Ensure the active participation of the national environmental authority in the new institutional structures on sustainable development to be created at the national level". The two subsidiary committees are expected to meet several times a year but must meet annually anyway to endorse their annual reports to the National Commission. The Committee for Monitoring and Support of the SNDD is in turn supported by interministerial platforms for monitoring the SNDD and a committee of focal points, which met five times during the period between the first and second meetings of the main body. The committee of focal points comprises technical experts from all ministerial departments, who share good practices, for example, and meet at least monthly. There are also thematic working groups that share good practices and plan next steps to meet goals of the PEA. A Project Management Office has been established by the Department of Sustainable Development to monitor implementation of the SNDD.

The National Commission on Sustainable Development is to meet annually. Its meeting in June 2020 resulted in the adoption of the 2019 SNDD implementation report and the 2020 VNR. The National Commission invited ministerial departments to accelerate their implementation of the PEA, among other decisions. It also tasked the Department of Sustainable Development to evaluate the SNDD in the light of national developments and international commitments

Department of Sustainable Development

The Department of Sustainable Development is the national environmental authority responsible for developing and implementing national environmental policy. It is also responsible for the coordination of environmental protection at the national and, through its regional environment directorates (DREs), regional levels. The Department of Sustainable Development and the Department of Energy and Mines, each headed by a Secretary-General, together comprise the

Ministry of Energy Transition and Sustainable Development.

Photo 1.3: The ministry in charge of the environment



Photo credit: ECE EPR Team

Established in 1992, the Department of the Environment had the mission “to develop and implement the Government’s policy on environmental management” (Decree No. 2-99.922 of 13 January 2000 on the organisation and attributions of the Secretariat of State to the Minister of Land Management, Environment, Urban Planning and Housing in charge of the environment (OB No. 4770 of 2000)). In 2014, Decree No. 2-14-758 of 23 December 2014 establishing the attributions and organisation of the Ministry in charge of the environment expanded the Department’s missions to include sustainable development. According to this decree, the Department of the Environment is responsible for:

- The elaboration of the SNDD and the follow-up of its implementation and evaluation, in coordination and collaboration with the ministerial departments concerned;
- The proposal of draft laws and regulations relating to environmental protection and the control of

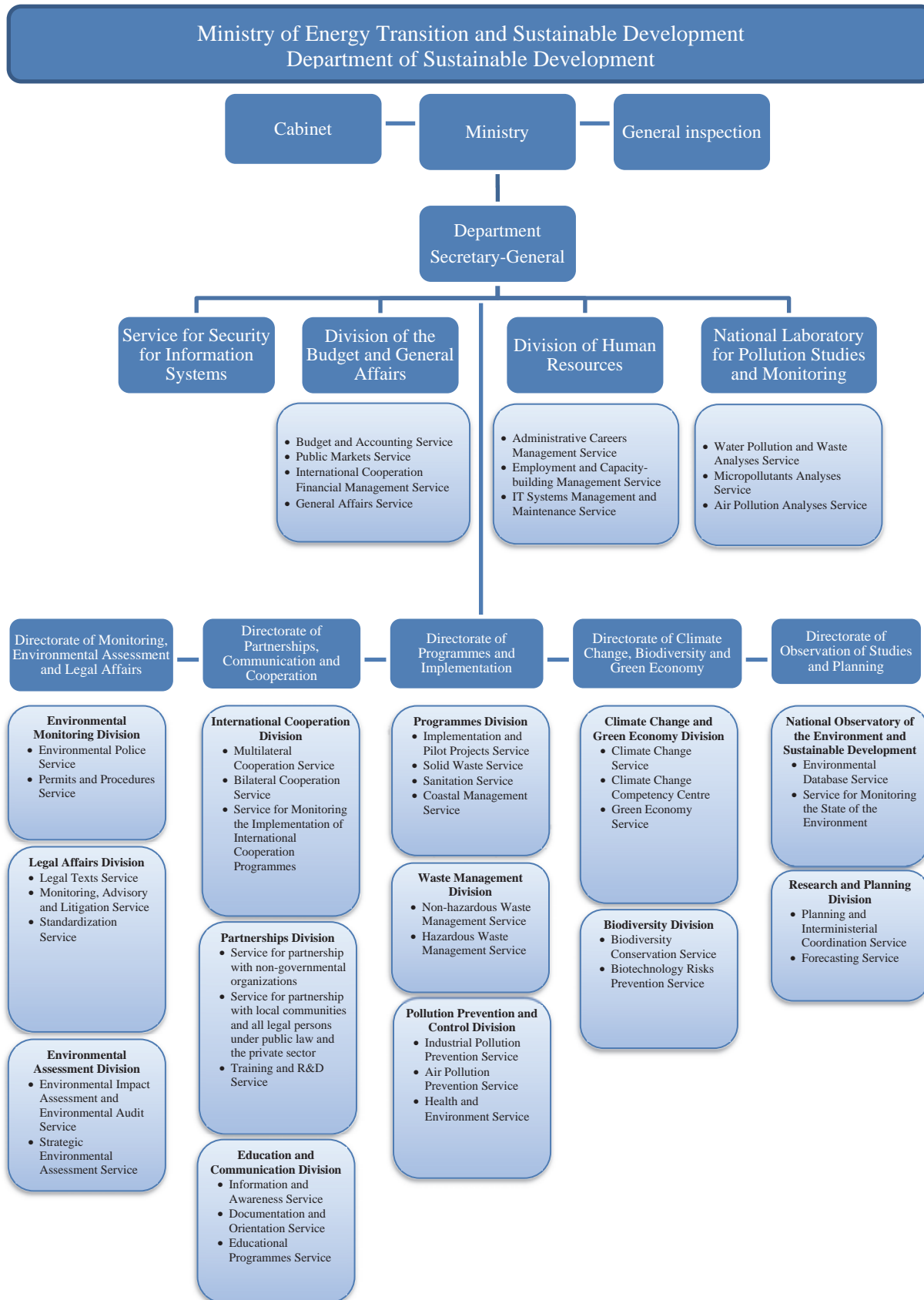
their application in accordance with the legislation in force;

- Representing the Government in bilateral and multilateral negotiations in the field of environmental protection and sustainable development, considering the competences of the ministerial departments concerned;
- Considering the dimension of climate change and the green economy and participation in the protection of biodiversity in government policies, strategies and programmes;
- Participation in the development, implementation, monitoring and evaluation of national environmental programmes in collaboration with the relevant ministerial departments;
- The development of bilateral, regional and international cooperation in the field of environmental protection and sustainable development;
- The promotion of cooperation with public bodies, local authorities, the private sector and non-governmental organisations on environment and sustainable development;
- Establishing the necessary structures for observing and monitoring the state of the environment and collecting environmental data and information at national and regional level in collaboration with the relevant departments;
- Integration of the environmental dimension in development, education, training and scientific research programmes in collaboration and coordination with concerned parties;
- Monitoring the strategic environmental assessment of public development policies and programmes;
- Monitoring the environmental impact assessment of investment projects and activities in consultation with the relevant departments.

In October 2021, a new government was elected. A cabinet reshuffle took place and the Department of the Environment became the Department of Sustainable Development.

The Department of Sustainable Development is organized (as defined in Decree No. 2-14-758 of 2014 and Decree No. 2-15-329 of 2015), with five directorates and two divisions (handling the budget and general affairs, and human resources) reporting directly to the Secretary-General (figure 1.3). The Secretary-General also oversees the DREs and the National Laboratory for Pollution Studies and Monitoring (LNEP).

Figure 1.3: Organigram of the Department of Sustainable Development



Source: Ministry of Energy Transition and Sustainable Development: www.environnement.gov.ma/fr/departement-de-l-environnement/2015-03-05-11-53-51/2015-03-05-11-58-41/organigramme.

At the time of the first EPR, the Ministry included Departments of the Environment and of Water. In the period 2013–2017, both the Department of the Environment and the Department of Water were raised to the status of delegated ministries within the Ministry of Energy, Mines, Water and Environment; the delegated ministry of the environment was reorganized in 2015 (Ministerial Order No. 1386-15). In 2017, the Department of Water was moved to join the then Ministry of Equipment, Transport, Logistics and Water (Decree No. 2-17-201), where it became the DGE headed by a Secretary of State. At the same time, in 2017, the then Ministry of Energy, Mines, Water and Environment became the Ministry of Energy, Mines and Sustainable Development (Decree No. 2-17-203), with the position of Secretary of State for Sustainable Development also being established.

The policy of the Department of Sustainable Development includes:

- Consolidation of environmental governance and sustainable development in accordance with the objectives of advanced regionalization and the decentralization charter;
- Environmental upgrading and the improvement of the living conditions of citizens;
- Promotion of the transition to a green economy;
- Preservation of natural resources and environmental media and their valorization; Mobilization of stakeholders and partners on environment and sustainable development.

The policy of the Department of Sustainable Development includes:

- Consolidation of environmental governance and sustainable development in accordance with the objectives of advanced regionalization and the decentralization charter;
- Environmental upgrading and the improvement of the living conditions of citizens;
- Promotion of the transition to a green economy;
- Preservation of natural resources and environmental media and their valorization;
- Mobilization of stakeholders and partners on environment and sustainable development.

The SNDD aims to strengthen the consideration of environmental damage in public policies to decouple economic growth from pressure on resources, but also to create sustainable green jobs in jobs related to the environment. Though the then Department of the Environment was “downgraded” after adoption of the SNDD, and Recommendation 1.1 (a) of the first EPR (“Consider restoring the status of the national environmental authority to that of a ministry”) has not

been answered, staff are motivated and believe they have political support at the highest level so do not see the Department’s status as a constraint. The Department considers that it had adequate resources to carry out its coordination role; it has continued to grow in terms of staff numbers, budget and decentralized representation.

The projected budget of the Department of Sustainable Development in 2020 was 1,076 billion dirhams, including 600 million dirhams for the PNAM, 200 million dirhams for the PNDM and 60 million dirhams for the protection and enhancement of environmental media.

The Department has adopted a participatory approach to involve NGOs in the implementation of the strategic projects on environment and sustainable development, in particular through the following actions:

- Involvement of civil society in various consultative processes for the preparation of strategies and action plans, including the SNDD, the PNL, the SRL. Civil society also plays an important role in the implementation of the national policy on climate change, through the contribution in the development, monitoring and implementation of the National Climate Plan, as well as the contribution in the development of the NDC. It is also represented on several national commissions, in particular the national commission for sustainable development, the national commission for integrated coastal management and the national commission for climate and biodiversity. The selection of associations within these commissions is made on the basis of a call for applications.
- Capacity building for the benefit of environmental associations to enable them to carry out the missions assigned to them by the Constitution in relation to Sustainable Development. The Department organizes annual training workshops in all regions of Morocco, on topics related to the environment and sustainable development (regulations, risk prevention, fight against climate change, protection of biodiversity, enhancement of ecosystem services). Between 2016 and 2020, more than 1,500 associations have benefited from this training and several associative initiatives have emerged.
- Financial support for associative initiatives. The Department also contributes to the financing of associative projects via calls for projects on environment and sustainable development which aim to promote initiatives and actions of proximity and mobilization of the population. in the process of sustainable development initiated by Morocco.

About 173 associative initiatives have been supported by the Department in themes related to the preservation of natural resources, waste recovery, eco-districts, agroecology, climate change and eco-tourism. Several successful initiatives have been listed and capitalized on.

The Department provides the secretariat for, among others, the National Council for the Environment, the Committee for Monitoring and Support to the SNDD, the National Commission on Climate Change and Biodiversity and the Standing Committee on Air Quality Monitoring and Surveillance. It is represented in many other coordination bodies, such as councils and commissions. It coordinates the implementation of the SNDD. In addition, staff of the Department work with colleagues in other departments on a less formal basis in support of their day-to-day activities. The Department of Sustainable Development often takes the lead in the drafting of environment-related strategic documents, such as the PNDM, PNA and PNAir.

National Laboratory for Pollution Studies and Monitoring

The LNEP was created to support the Department in achieving government priorities in pollution monitoring and control. It monitors and studies pollution and environmental nuisances and contributes to the creation of a monitoring and measurement network, among other tasks. It also supports the control of projects under the PNA and PNDM and that have been subject to EIA. The Laboratory comprises three analysis services, covering air pollution, water, and waste and micropollutants, plus administrative and quality assurance units. It underwent a review in 2014 to improve its equipment and was accredited for general requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005 standard) in 2019. Since 2012, the General Directorate of Meteorology (DGM) has managed the air quality monitoring network, though the Mohammed VI Foundation for the Protection of the Environment (box

1.1) has however contributed to this effort through the purchase of some air quality monitoring stations. In 2020, the concerned parties signed a protocol to transfer the network to the Department gradually over a period of three to four years.

National Observatory of the Environment and Sustainable Development

The National Environment Observatory became the National Observatory of the Environment and Sustainable Development (ONEDD) in 2015. It was established to improve the management of data and information on the environment and sustainable development and knowledge on the state of the environment, to strengthen the communication of results on the state of the environment and sustainable development, and to provide the authorities with decision-making tools on the preservation of the environment and the principles of sustainable development. ONEDD works in collaboration with its partners within the framework of the national committee for the exchange of information and data on the environment. It contributes to the reinforcement of the capacities of the Regional Observatories for the Environment and Sustainable Development (OREDD) by participating in their activities even if they are part of the Regional Directorates for the Environment.

To facilitate environmental decision-making and ensure wide dissemination of environmental information and data, ONEDD has recently carried out several activities, including:

- The elaboration and publication of the Fourth National Report on the State of the Environment (SOER) in Morocco;
- The setting up of SIREDD in the 12 regions of the country;
- The elaboration in coordination with the OREDD of reports on the state of the environment in the 12 regions.

Box 1.1: Mohammed VI Foundation for the Protection of the Environment

The Mohammed VI Foundation for the Protection of the Environment was established by the King in 2001 with a mission to raise awareness of and educate on sustainable development. Many ministries are represented on the Foundation's board of directors and the Foundation's Secretary-General is a member of the Economic, Social and Environmental Council. The Foundation is also a member of the National Commission on Climate Change and Biodiversity. One example of the Foundation's work is it having undertaken eco-epidemiological studies of the effects of air quality, working with the Ministry of Health and Social Welfare, the General Directorate for Local Authorities of the Ministry of the Interior, and the local authorities. Another example is the establishment of a national air quality monitoring network with 30 stations in 15 cities. The Foundation holds workshops every year to strengthen capacities of local authorities, based on an agreement with the General Directorate for Local Authorities. In 2019 it set up a training centre on, among other things, water, energy and waste management.

Photo 1.4: View of the Oued Massa River

Photo credit: Department of Sustainable Development

Environmental Police

The Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development established the Environmental Police to support other authorities in terms of prevention, control and inspection. In 2015, Decree No. 2-14-782 defined the organization and functions of the Environmental Police. The Environmental Police deal with matters covered by Law No. 11-03 on the Protection and Conservation of the Environment, EIA conditions, air pollution and waste, not with biodiversity or protected areas. Qualified staff of the Department of Sustainable Development obtain a warrant card but maintain their normal responsibilities. The Police do not have additional resources. The Environmental, Water, Forest and Quarry Police each have their own responsibilities and work separately and do not seek synergies.

Regional Environment Directorates

Until 2014, there were 16 regions, and the Regional Environmental Services were external to the Department of Sustainable Development. The OREDDs were separate also. The 12 DREs emerged in 2016 (Ministerial Order No. 1362-16) as stronger successors to the regional services as a result of the

overall decentralization policy; this transition responds positively to Recommendation 1.1 (c) of the first EPR, to “Raise and formalize the status and strengthen the capacity of the national environmental authority’s regional offices”. The decentralization policy was later expressed in the National Charter of Administrative Decentralization, in Decree No. 2-17-618, which foresees completion of the process in 2022. The Director of each DRE reports to the Secretary-General of the Department of Sustainable Development. Some issues, such as natural disasters and climate change, are handled at the central level (the Ministry of the Interior and the Department of Sustainable Development, respectively), for example.

Taking the Rabat-Salé-Kenitra DRE as an example, it comprises three services, one of which is now the OREDD; the second handles EIAs and monitoring and the third, environmental management. The Directorate has 14 experts and four technicians, with four experts having been added since 2016.

The DREs are members of regional committees on urbanism and public health, among others, and the CRUIs (and their EIA commissions). They also implement national strategies and programmes, such as the PNA and the PNDM, and respond to requests regarding air, water, industry and infractions. Each

DRE cooperates with one or more ABHs and the DGE, though little with the environment-related police forces. There is also much cooperation between the central divisions of the Department of Sustainable Development and the DREs, for example on chemicals and waste.

The OREDDs collect, analyse and manage information and data relating to the environment and sustainable development from the various public and private sector partners and actors in each region, make decision-support tools available to local stakeholders, promote the preservation of the environment at the local level and strengthen the integration of environmental considerations in local development projects and economic activities. Regional Information Systems for the Environment and Sustainable Development (SIREDDs) are being rolled out across the regions (e.g., in the Rabat-Sale-Kenitra Region¹⁹). As part of the transfer of the air quality monitoring network to the Department of Sustainable Development, the OREDDs will manage regional networks and then transfer data to the national level.

Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests

The Ministry now comprises the Department of Agriculture, which also covers rural development, the Department of Marine Fisheries and the Department of Water and Forests. Previously, the High Commission for Water, Forestry and the Fight against Desertification reported directly to the Head of Government (i.e., it was a ministerial department). In 2017, it was merged with the then Ministry of Agriculture and Marine Fisheries (Decree No. 2-17-197) and headed by the Secretary of State for Rural Development, Waters and Forests until 2019; the position of High Commissioner persists.

The Department of Water and Forests is responsible for developing and implementing government policy in the fields of conservation and sustainable development of forest, grassland and mixed resources in areas subject to the forest regime, including protected areas, as well as the development of hunting, freshwater fish farming and natural parks and reserves. It also coordinates work on combating desertification and participates in government activities in rural development. It cooperates with many other actors, for example: ONEE Water Branch and the Department of Agriculture (on irrigation) on watershed protection for the catchments of about 60 dams; directly with the Department of Sustainable Development Biodiversity Division on protected areas and desertification; and

with the Department of Marine Fisheries on the marine environment. There is also cooperation, for example in the development of strategic documents, with the Department of Energy and Mines (on biomass) and Department of Tourism.

The Forest Police deals with forests and protected areas, and fauna and flora (i.e., biodiversity). It has local teams, is well equipped and trained and has, for example, specialized teams dealing with wildlife. A European Union-funded project worked with the Forest Police in 2015 to strengthen coordination between the Department of Agriculture and Department of Water and Forests.

Forests of Morocco 2020–2030 anticipates national agencies for water and forests and for national parks (i.e., protected areas), and legislation to this effect is being drafted.

The Department of Water and Forests has subordinate units at the regional level – the Regional Directorates for Water and Forests and the Fight against Desertification – and at provincial and local (regional) forest levels. Agreements between different stakeholders extend down to the level of individual forest regions and the deliberation of forestry projects often involves communal authorities. Local forestry units often work with ABHs.

The Department of Marine Fisheries supplies data related to SDGs to the HCP and is a member of the National Commission on Sustainable Development.

The National Institute of Fisheries Research (INRH), under the Department of Marine Fisheries, has an environmental research programme and carries out monitoring with a limited network; it cooperates with other departments. Cooperation among ministerial departments on marine pollution is particularly broad, bringing together the National Ports Agency, the Departments of Marine Fisheries, the Environment, and Water and Forests, and the Royal Navy, Royal Gendarmerie and Royal Air Force.

Ministry of Equipment and Water

The former Department of Water joined the then Ministry of Equipment, Transport, Logistics and Water in 2017 as a General Directorate headed by a Secretary of State for Water, until 2018. The Ministry underwent a further reorganization in 2020 (Decree No. 2-19-1094). The Ministry of Equipment and Water now comprises the Department of Transport and the DGE. The DGE, under a Secretary-General,

¹⁹ <https://siredd.environnement.gov.ma/Rabat-Sale-Kenitra/Home>.

includes five Directorates: of Water Research and Planning; of Hydraulic Facilities; of Meteorology; of Legal and Land Tenure Affairs; and of Administrative and Financial Affairs. The DGM includes, in turn, the National Climate Centre, the National (weather) Forecasting Centre, the National Centre for Meteorological Research and six regional directorates. The Directorate of Water Research and Planning oversees 38 Provincial Water Services. The DGE also provides the secretariat for the High Council for Water and Climate. It works with the Department of Sustainable Development on water quality and wastewater issues, with clear lines of responsibility.

The Water Police (Decree No. 2-18-453) has limited capacity to tackle water pollution because of a lack of staff, equipment to take samples and accredited laboratories to undertake analyses, as well as legal ambiguities. The approximately 200 Water Police agents across the country do not work full time for the Water Police as they also have normal desk jobs. The agents receive some training and are provided with a guide. Less than half of them are in uniform.

The 10 ABHs are in charge of the implementation of water policy under the DGE. They are responsible for assessing, planning, managing and protecting surface and groundwater resources and granting authorizations and concessions on the use of water in the public domain. Each ABH is responsible for developing a master plan for integrated water resources management (PDAIRE) and overseeing its implementation. The ABHs coordinate closely with ONEE, among others.

Ministry of Industry and Trade

Responsibility for green economy was transferred to the then Ministry of Industry, Trade and Green and Digital Economy in 2020, together with the Moroccan Agency for Energy Efficiency (AMEE), though the Department of Sustainable Development continues to lead on the SNDD, which still includes green economy. In 2021, these responsibilities were transferred back to the Department of Sustainable Development. The green economy work covers clean production, sustainable mobility and energy efficiency. On mobility, for example, the focus is on the industrial side, such as the construction of electric vehicles. For energy efficiency, cooperation is with the Department of Energy and Mines (of the Ministry of Energy Transition and Sustainable Development), as well as AMEE. The Ministry of Industry and Trade has discussed the transition of the industrial sector to a green economy with the Department of Sustainable Development and the Global Green Growth Institute, which may lead to an agreement among them on

cooperation. It also works with the Department of Sustainable Development to support implementation of the National Strategy for Waste Reduction and Recovery. More generally, the Ministry undertakes studies with industry and accompanies enterprises in identifying new technology and seeking compliance with environmental standards and conditions. The coordination between the Ministry of Industry and Trade and the Department of Sustainable Development on chemicals is ad hoc; there is only a consultative committee on the import of chemicals, because of the lack of a legal structure.

Ministry of Health and Social Welfare

The Ministry of Health and Social Welfare prepares and implements government policy in the field of health. The Ministry's Environmental Health Division has about 30 staff spread across five services, covering air (in cooperation with the Department of Sustainable Development and the DGM), food safety (with the Department of Agriculture and the National Office of Food Safety (ONSSA)), water and hygiene (with DGE and ONEE), vectors (with the Ministry of the Interior and the Department of Sustainable Development) and laboratory and intersectoral work. The Ministry has a strong presence at regional and provincial levels with about 500 staff in these units. The Environmental Health Division works with the Ministry of Industry and Trade and, in particular, the Moroccan Standards Institute (IMANOR), for example on recently updated standards on drinking water, sampling frequency and lead in paints. There is no clear framework for cooperation with the Department of Sustainable Development.

Ministry of the Interior

At the central level, two branches of the Ministry of the Interior are involved in environmental management. The General Directorate for Local Authorities provides legal, technical and financial support to local authorities in the exercise of their powers and provides the necessary assistance for the development of their human and technical capacities. It therefore plays a role in local plans for waste, water, sanitation and hygiene. The local authorities comprise authorities at the regional, prefectural, provincial and communal levels, which have environmental responsibilities. Because of its role in wastewater management, the General Directorate is also involved in coastal zone management and marine pollution from land-based sources. The public water utilities are autonomous units under the Ministry (except the privatized concessions in major cities). The National Sanitation Committee, which oversees the PNAM, is also under the Ministry.

The General Directorate for Civil Protection helps the population in the event of natural and technological disasters, as well as everyday accidents and chemical safety. Its structure includes regional, prefectural and provincial civil protection commands. Depending on the nature of the disaster, different authorities cooperate. For example, ABHs, the DGE, the DGM and the Ministry of the Interior are involved in dealing with floods, the Department of Water and Forests with forest fires, the Ministry of Industry and Trade with industrial accidents and the Ministry of Health and Social Welfare with sanitary risks. In 2013, the Regional Office for the Prevention of Nuclear, Radiological, Biological and Chemical Risks for 10 African countries on the Atlantic coast was established in Rabat. There are plans to establish a national observatory of risks and an interministerial committee on the management of risks, with regional and provincial commissions. The national committee will have three permanent commissions examining risks related to climate, earthquakes and landslides, and tsunamis and the coastal zone.

Ministry of Tourism, Handicrafts and Social and Solidarity Economy

The Ministry of Tourism, Handicrafts and Social and Solidarity Economy comprises three departments, responsible for tourism, handicrafts and social and solidarity economy. The Department of Tourism focuses on four products, addressing seaside (beach), cultural, sustainable and domestic tourism. It is responsible for the promotion of tourism and the management of infrastructure in sites of particular importance for the country's biodiversity. The Department of Tourism cooperates with the Department of Sustainable Development in a range of areas, such as on the benefits of ecotourism and helping tourism agencies improve their services.

Ministry of Youth, Culture and Communication

The Ministry's Department of Culture has established measures to ensure the protection and conservation of movable, immovable, intangible and natural cultural properties of the coastal zone, in particular through the effective implementation of the World Heritage Conventions (chapter 7).

The Department is in charge of the management and protection of cultural heritage through the Directorate of Cultural Heritage, the National Institute of Archaeology and Heritage Sciences (NIAHS) and the Centre for Restoration and Rehabilitation of the Architectural Heritage of the Atlas and Sub-Atlas

Areas. Since 2016, the Department has strengthened the institutional framework by:

- Establishing regional heritage conservation services (Order of the Minister of Culture No. 1701-16 of 10 June 2016), as part of the organization of decentralized services of the then Ministry of Culture, Youth and Sports. They include two main entities for the protection and enhancement of the national cultural and natural heritage: inspection of historical monuments and archaeological sites and heritage inventory services;
- Creating heritage interpretation centres (CIPs) aimed at the preservation, development and promotion of the cultural and natural heritage of each region, for example:
 - Azrou, which has a large section dedicated to the exhibition of elements of natural heritage of the Middle Atlas, alongside the section of tangible and intangible cultural heritage of the region;
 - The prehistoric site Sidi Abderrahmane and Thomas quarries in Casablanca, which will present the prehistoric, paleontological and palynological heritage of the coastal area of Casablanca;
 - The Portuguese Misqat in El Jadida;
 - Bab Laalou in Rabat;
 - Villa Perdericas in Tangier;
 - Olhao Garden in Agadir.

National Office of Electricity and Drinking Water

The National Office of Drinking Water was merged with its sister office responsible for electricity in 2012 to form ONEE, while preserving two distinct branches. The Water Branch, with its 11 regional directorates, manages the production and treatment of urban and rural water supplies and, in some areas, water delivery. It aims to secure supplies of drinking water and provide water for all, while also managing demand. It is also active in sanitation and environmental protection, checks the quality of water resources and undertakes studies of water resource protection areas. Drinking water quality is assured by a central laboratory and 10 regional directorates with more than 100 drinking water and wastewater laboratories, serviced by a staff of more than 300. Plans are being elaborated to reduce the costs to the population by merging public utilities into 12 regional agencies fully responsible for water supply, sanitation and electricity.

Regional Investment Centres

Morocco has seen the creation of 12 Regional Investment Centres (CRI) under the responsibility of the walis of the regions. These CRIs aim to ensure two main missions, namely assistance to business creation and investment assistance. The 2019 Law No. 47-18 on the Reform of Regional Investment Centres and the Creation of Unified Regional Investment Commissions stipulates, among other things, the creation of a CRUI by merging all the former regional commissions in charge of investment with the aim of improving decision-making procedures and guaranteeing an integrated and coherent treatment, while opting for administrative deconcentration with regard to the processing and granting of the necessary authorisations, notably environmental acceptances at regional level for the realisation of investment projects.

Horizontal coordination

Besides informal contacts among staff in different departments working on similar issues, there are many agreements made between departments to provide a framework for cooperation. In addition, joint studies and training courses are carried out, for example between the Departments of the Environment and of Water and Forests. In the event of an emergency, such as accidental pollution, all relevant departments work together. However, these informal arrangements do not lead to the formal exchange of data, for example between the Departments of the Environment and of Water and Forests. The SNDD provides a framework that enhances coordination and coherence, including through common efforts on the PEA and sectoral Sustainable Development Action Plans.

In addition, a comprehensive and complex web of commissions, councils and committees has developed over the years to oversee common areas of work. Many of them are limited to a consultative role, providing a platform for dialogue and cooperation, whereas the National Commission on Sustainable Development has decision-making powers, and the Economic, Social and Environmental Council is a constitutional body. The composition of the bodies varies enormously but most bring together several ministerial departments and some have a place for civil society representation or consultation.

At the time of the first EPR, the National Council for the Environment was a body with high political visibility that was frequently consulted. It is normally chaired by the national environmental authority and the Department of Sustainable Development provides the secretariat. However, the National Council held its

most recent, eighth meeting in 2016, the only such meeting since the first EPR. A review of bodies that have become less active, or inactive, is reportedly under way to see whether rationalization is possible. This review and current clarifications of the roles of the bodies would be a welcome response in part to Recommendation 1.1 (d) of the first EPR: “Promote better coordination among and greater effectiveness of the work of the High Commission for Water, Forestry and the Fight against Desertification and the national councils (i.e., the National Council for the Environment, the High Council for Water and Climate, and the National Forest Council)”. Some departments lack enough staff to participate in all meetings of the numerous bodies.

The National Commission on Climate Change and Biodiversity was established in 2020 (Decree No. 2-19-721). It includes two Subcommissions, on Climate Change and Biodiversity, the latter having met in December 2020 for the first time to agree on its rules of procedure; it is expected to meet a couple of times per year in future, as required. The Subcommission on Biodiversity replaced the National Committee on Biodiversity, which had its own platform for sharing information; the new National Commission is expected to have a similar platform, where its reports will be made available. The National Commission brings together representatives of numerous ministries, scientific research institutes, civil society (three NGO members) and the private sector.

The long-standing High Council for Water and Climate was given a new lease on life by Law No. 36-15 on Water. Decree No. 2-18-233 to apply the relevant provisions of the Law on Water was reportedly adopted in 2019 but is not available in the Official Bulletin; no meeting reports are available on the website of DGE since 2001. The High Council is presided over by the Head of Government and includes many representatives of authorities at the regional and basin levels. It is responsible for examining and giving its opinion on the general orientations of the national water and climate policy, decides on the PNE and takes major decisions on matters affecting multiple departments.

The Economic, Social and Environmental Council is a constitutional body, established in 2014 under Part XI of the 2011 Constitution. The Government, House of Representatives and House of Councillors consult the Council. It gives its opinion on the general orientations of the national economy and sustainable development and publishes an annual report in the Official Bulletin.

The National EIA Committee brings together many departments and draws upon additional experts in

complex cases. The Regional EIA Committees have been absorbed into the new CRUIs. The National EIA Committee can establish subcommittees for key issues (Law No. 49-17).

Other such bodies include the National Commission on Integrated Coastal Zone Management (Decree No. 2-15-769), National Forest Council, Interministerial Commission on Water (Decree No. 2-14-500), Interministerial Commission for the Development of Rural Areas and Mountainous Zones, set up in 2013 (Decree No. 2-12-624), Standing Committee on Air Quality Monitoring and Surveillance, which oversees the implementation of the PNAir, and urbanism and wetlands committees.

Subnational authorities and their environmental responsibilities

Further to the Organic Law on the Regions (No. 111-14), each region is expected to contribute to the achievement of sustainable development. Competences at the regional level include the development and management of regional parks, the development of a regional energy and water economy strategy and the promotion of initiatives relating to renewable energies. Competences shared with the State include: the prevention of floods; the conservation of natural resources, biological diversity and the fight against pollution and desertification; and the conservation of protected areas, forest ecosystems and water resources. The State transfers the energy, water and environmental areas of competence, among others, to the region based on the principle of subsidiarity.

The CRUIs (Law No. 47-18), established in 2019, have absorbed the Regional EIA Committees and much more, for example, the addressing of coastal zone issues. A representative of the DRE is a member of the corresponding CRUI, just as the earlier Regional Environmental Service was a member of the Regional EIA Committee; the Ministry of Health and Social Welfare is also represented, for example. A regional service coordination structure is being established.

At the provincial or prefecture level, further to the Organic Law on the Prefectures and Provinces (No. 112-14), competences shared with the State include the obligation of developing mountainous and oasis areas and contributing to supplying rural areas with drinking water and electricity.

Finally, at the communal level and according to the corresponding Organic Law, through competences shared with the State, the authorities can contribute to

environmental protection, management of the local coastline and the development of local beaches, lakes and riverbanks. The State transfers the conservation of natural sites, among other areas of competence, to the commune based on the principle of subsidiarity. The communal council deliberates town planning, construction, land-use planning and environmental protection, among other matters. The president of the council organizes and participates in the control of non-regulated commercial, craft and industrial activities liable to endanger health or be harmful to the environment. Below the communal level, a borough council sets up permanent committees, which include one member who examines urban planning and environmental affairs. The borough council can propose actions to the communal council, for example, to protect the local environment. The communal level can, where appropriate, enact emergency measures for the protection or conservation of the environment.

1.6 Assessment, conclusions and recommendations

Assessment

The legal foundations for environmental protection and sustainable development have been strengthened since the first EPR, most importantly with the Framework Law on the CNEDD. The CNEDD and the SNDD give clear direction to the needed legislative development. Some new media-specific and horizontal legislation has also been adopted or reinforced, though gaps remain and implementing regulations lag behind. Grace periods and derogations are often provided. Several new laws are being prepared and gaps, for example in biodiversity law, are being reviewed.

Similarly, the CNEDD and SNDD provide strong policy foundations. Several policy documents expired in 2020 and the pandemic situation has had an impact on their evaluation, extension or replacement. Delays in the adoption of the Law on Environmental Assessment until 2020, and the lack of implementing legislation, mean that policy documents are now being adopted without having been subject to SEA.

The Government has established the necessary institutional framework for the oversight of its efforts to achieve sustainable development. It has also assigned clear roles to the Department of Sustainable Development and the HCP. The former has undertaken a series of studies to support progress towards sustainable development. Nonetheless, the SNDD is not completely aligned with the 2030 Agenda and the Department of Sustainable Development may lack leverage with other ministries.

There is a perception of strong political support for the environment, though the environmental dimension remains the humblest with respect to sustainable development. DREs have been set up and the responsibilities of the departments in charge of water, forests and the environment are distinct. The Department of Sustainable Development engages civil society constructively. Several environment-related police forces now exist, though some have inadequate resources.

Several recommendations made in the first EPR have been acted upon, with the Department of Sustainable Development playing a key role in support of sustainable development, the establishment of DREs, and the adoption of the SNDD, the Framework Law on the CNEDD and Laws on Environmental Assessment and the Coastal Zone. The challenge of adequate financing for the SNDD and the 2030 Agenda is recognized, and recommendations have been made to mobilize resources. Reporting mechanisms for the SNDD and PEA are in place though not open to the public. The Department of Sustainable Development lacks ministerial status. Some coordination bodies have been reinvigorated, but the large number of such bodies, some inactive, may impede coordination. Implementation of ICZM is at an early stage.

Conclusions and recommendations

Legal coherence

Regulatory impact assessment is a vital tool for legal coherence and informed legislative decisions. However, the passing of a decree on this tool has not resulted in its routine application. Implementing regulations on the new Law on Environmental Assessment are needed to give it effect. Other environmental legislation is being drafted but needs to be completed and adopted. It is difficult to follow the implementation of legislation because of the large number of decrees and orders needed to implement the primary legislation and the extended period taken to adopt them.

Recommendation 1.1:

The Government should:

- (a) *Continue to ensure that regulatory impact assessment is undertaken for major laws, and the results are published;*
- (b) *Rapidly adopt implementing legislation. to give full effect to the Law on Environmental Assessment regarding environmental audit and strategic environmental assessment,*

including by providing for public participation;

- (c) *Prepare or complete and then adopt legislation on climate change, soils, ecosystems and biodiversity, mountainous areas, noise and other nuisances, chemicals, waste, environmental health and an environmental liability regime;*
- (d) *Accelerate the adoption of the implementing legislation., including on the management of protected areas, emissions of key air pollutants from all the main polluting sectors, discharges into coastal waters and the dredging of marine sand;*
- (e) *Introduce a public mechanism to track the adoption of secondary legislation necessary for the implementation of laws, indicating responsibility and the schedule for drafting and the current status, and publish consolidated legal texts and jurisprudence.*

Adoption of strategic documents

In some instances, new national plans, such as that for coastal zone management, await adoption. In others, national plans have been adopted – for example, the National Strategy of Natural Disaster Risk Management, – but regional plans have yet to follow. The sectoral Sustainable Development Action Plans and the Exemplary Administration Pact are important mechanisms, though some government departments have advanced less than others and the online monitoring system is not publicly available.

Recommendation 1.2:

The Government should:

- (a) *Ensure the monitoring of the implementation of the National Plan for the Coastal Zone;*
- (b) *Adopt the Roadmap on Sustainable Consumption and Production;*
- (c) *Adopt the last version of the National Watershed Management Plan;*
- (d) *Review and issue updated versions of other environmental plans that have expired;*
- (e) *Roll out regional disaster risk reduction strategies, climate plans, coastal zone management plans and integrated management of natural risks;*
- (f) *Encourage all departments to make progress on their Sustainable Development Action Plans and their contributions to the Exemplary Administration Pact and continue publishing information on progress made.*

Strategic environmental assessment

Though the legal basis for SEA is now in place, regulations (Recommendation 1.1 (b)) and guidance are lacking. A role in SEA should be given to the public. In addition, the country lacks experience in undertaking SEA of plans and programmes.

Recommendation 1.3:

The Government should:

- (a) *Accelerate the adoption of the legislation and decrees to implement the law regarding environmental assessment;*
- (b) *Continue to develop the necessary methodological guidance materials for the strategic environmental assessment of sectoral and local plans and programmes through joint efforts of the ministry responsible for the environment and other authorities concerned, and through pilot assessment exercises involving the public and possibly of plans or programmes recently adopted.*

Recommendation 1.4:

The Department of Sustainable Development should continue assisting and guiding other departments and authorities at the national and local levels in their application of the strategic environmental assessment tool.

Alignment between strategies

The lack of alignment between the SNDD and the 2030 Agenda means that there is not clear feedback from ministerial departments to the National Commission on Sustainable Development on their progress towards the SDGs. The availability of data to underpin environment-related SDG indicators is poor. Implementation of the 2030 Agenda needs to be accelerated including through mobilization of the necessary financial resources.

Recommendation 1.5:

The Government should:

- (a) *Implement the findings of the assessment of the National Sustainable Development Strategy and accelerate the alignment of the*

Strategy more closely with the 2030 Agenda for Sustainable Development;

- (b) *Invest further resources in monitoring networks and other means of gathering environmental data needed to monitor progress towards the Sustainable Development Goals;*
- (c) *Implement the recommendations on how to catalyse the necessary funds for the 2030 Agenda as made in the 2019 evaluation of the necessary budget;*
- (d) *Convene a stakeholder group to score SDG indicator 17.14.1 on policy coherence for sustainable development, and implement the identified measures to raise its score;*
- (e) *Employ the conclusions and recommendations of this environmental performance review when preparing the country's next Voluntary National Review.*

Strengthen and simplify the institutional framework for environmental protection

The status of the governmental environmental authority as a department remains an impediment, including regarding the achievement of the 2030 Agenda. An unnecessarily complex web of numerous councils, committees and commissions has developed with overlapping mandates. The different police forces have differing resource levels and work independently.

Recommendation 1.6:

The Government should:

- (a) *Consider restoring the status of the governmental environmental authority to that of a ministry;*
- (b) *Review the mandates and activities of councils, committees and commissions related to the environment, terminate those that have not met in the past year or that lack a clear role, enforce the publication of their annual reports and include an automatic termination clause in their mandates;*
- (c) *Review the opportunities for the Environment, Water, Forest and Quarry Police forces to work together and achieve synergies in their environmental protection activities, while increasing resources available to the Environment and Water Police forces.*

Chapter 2

IMPLEMENTATION AND COMPLIANCE MECHANISMS

2.1 Authorizations

According to the current legislative framework, projects can only be approved and building permits issued if the effects of construction on the environment are assessed (Law No. 11-03). Dahir No. 97 of 1914 provides for construction and operation of industrial facilities. It stipulates that class 1 and 2 installations require permits issued by the competent authority. These permits may come with annexed rules intended to prevent fires and accidents of any kind, reduce the causes of insalubrity, odours or harmful emissions, and avoid water pollution, as well as general rules on hygiene and safety measures that must be observed during the construction of buildings and industrial operations.

Since the adoption of the Law on Environmental Impact Assessment (No. 12-03) in 2003, the granting of permits for projects requiring EIA is conditional on their environmental acceptability status by the governmental authority responsible for sustainable development. This requirement was reaffirmed by the 2020 Law No. 49-17 on Environmental Assessment. Notwithstanding, projects that have been approved by governmental authority responsible for sustainable development are not automatically granted a permit.

Types of authorizations

Recommendation 2.1 of the first EPR, which advised the Government to align national regulatory requirements for large installations, emission limit values for air and water, and environmental liability regimes with international good practices, has only been partially implemented with the adoption of new laws and regulations.

Atmospheric emissions

The 2003 Law on Combating Air Pollution (No. 13-03) limits the release of polluting emissions and discharges into the air to regulatory levels. For some industrial sectors, no authorization for air emissions from stationary sources is required, despite the establishment of general emission limit values (GELVs) and specific emission limit values (SELVs). This prevents effective control of industrial emissions.

In the majority of cases, assessments conducted by environmental authorities are based on the environmental monitoring and follow-up programme linked to the EIA for projects that have been granted environmental acceptability.

Discharge of wastewater

Any discharge likely to affect the public hydraulic domain (DPH) must be authorized by a ABH and is subject to the payment of a fee, as provided for in the Law on Water (No. 36-15). Discharge authorizations are granted after a 30-day public inquiry, in accordance with the modalities set in this law. The permit issued establishes the place of discharge, the maximum volume and flow rate, the duration of the permit, which cannot exceed 10 years (extensions are allowed), the limit values for the discharges, the conditions for sampling and the number of tests the permit holder must have completed by an approved laboratory. The discharge permit holders are subject to the payment of a water discharge fee that is based on “pollution units” discharged, which are determined by discharges of several contaminants, such as suspended solids, organic pollutants and heavy metals. Fees and collection methods are established by the relevant ABH.

A new type of permit was introduced by the new Law on Water. Since 2016, any reuse of wastewater requires authorization from the relevant ABH, which is given after approval from the appropriate authorities. The Law does not cover the internal recycling of wastewater by the permit holder or the reuse of wastewater from approved autonomous sanitation systems.

The 2015 Law No. 81-12 on the Coastal Zone prohibits any discharge that contaminates the coastline but allows for the discharge of liquid waste below SDLVs. In these cases, permits last for five years and are renewable, and give rise to fines when discharges exceed GDLVs. The Law applies to discharges from ships or platforms at sea and to industrial, commercial, agricultural, tourist or other land-based activities, and to housing estates. Moreover, the installation of a permanent discharge treatment system can be required for industrial installations.

Photo 2.1: Suburb of Rabat, seen from above

Photo credit: ECE EPR Team

Waste generation and disposal

Law No. 28-00 on Waste Management and Disposal requires that all industrial, hazardous, medical and pharmaceutical waste be treated only in specialized facilities certified by authorities responsible for sustainable development. The permit application must be accompanied by the decision on environmental acceptability made subsequent to an EIA. Permits are required for the opening and closing of regulated landfills in category 2 (industrial, medical and pharmaceutical waste) and category 3 (hazardous waste). The permit issuance process requires a public inquiry, the opinion of the municipal council where the landfill is located, and the agreement of the *wali* of the region or the governor of the prefecture or province concerned.

Table 2.1 shows the trends in permits issued by the Department of Sustainable Development from 2016 to 2020. The number of permits for the importation of hazardous waste from the Free Zone, as well as the number of permits for hazardous waste treatment facilities, have increased.

Surface and groundwater use

In compliance with the Law on Water (No. 36-15), ABHs issue permits and concessions for the use of surface and groundwater. Permit holders are subject to fees for using the water.

Natural resources use

In accordance with the provisions of the Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade and its 2015 implementing decree, the lists of wild flora and fauna species included in Appendices I, II and III of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are those classified in categories I, II and III of the said Law. The Department of Water and Forests, previously the High Commission for Water, Forestry and the Fight against Desertification, is the body responsible for issuing importation and exportation permits for CITES-listed species.

Table 2.1: Permits issued by the Department of Sustainable Development, 2016–2020, number

Type of permit	2016	2017	2018	2019	2020
Collection and transport of hazardous waste	20	8	14	9*	5**
Hazardous waste treatment facilities	7	3	1	2	11
Importation of hazardous waste from the Free Zone	78	89	173	206	167***
Importation of non-hazardous waste from the Free Zone	9	5	16	23	16***
Import of non-hazardous waste from a foreign country	38	112	104	24	24***
Exportation of waste	1	1	1	1	1

Source: Department of Sustainable Development, 2021.

Note: Collection and transport:

* 2019, 9 permits for the addition of vehicles and waste for previously authorized companies.

** 2020, 5 permits for the addition of vehicles and waste issued to previously authorized companies.

*** Importations for 2020 were determined at the beginning of October.

Additionally, the Department of Water and Forests oversees hunting through a policy whereby hunting rights are leased to hunting associations or companies and which is based on specifications for the actions and measures to be implemented for the improvement of hunting on leased land. As regards fishing activities, eel fishing is only allowed under a fishing rights lease framework that contains specific provisions guaranteeing the sustainable fishing of the species. For other species, commercial fishing rights are granted either through licences or through the leasing of fishing rights.

Forest-use rights are also managed by the Department, in accordance with forestry legislation, which is based on Dahir No. 1335 of 10 October 1917 on the conservation and exploitation of forests and the 1976 Law No. 1-76-350 on the Organization of the Participation of the Population in the Development of the Forest Economy, and their respective implementation decrees.

Underground resources use

In accordance with the 2015 Law on Mines (No. 33-13), the use of underground resources is subject to:

- An exploration permit;
- A prospection permit;
- An exploitation licence for mines;
- An exploitation permit for heap leaching operations;
- A prospection permit and an exploitation licence for cavities.

The permits are issued by the public administration in charge of mines, the Department of Energy and Mines of the Ministry of Energy Transition and Sustainable Development. In the case of the exploitation licence, the rightsholder is required to conduct an EIA and to

show proof of environmental acceptability (environmental permit), in accordance with applicable laws and regulations. The obligation to conduct an EIA or to produce a simplified environmental impact statement (EIS) for projects having a more limited environmental impact does not apply to exploration or prospection permits.

Moreover, the Law on Mines does not require a public inquiry or that EIAs be conducted by accredited consultancy companies. Also, the granting of exploitation licences for mining is not conditional on the elaboration of a closure and rehabilitation plan for the mine that would include environmental and social aspects. Nor does it provide for the establishment of a specific guarantee fund for the rehabilitation of the site once operations cease. The only requirement is the establishment of civil liability insurance to cover the rightsholder for incidents arising from mining operations. However, Decree No. 2.18.548 issued in application of the said law required the operator to carry out, before abandoning its operation, the necessary rehabilitation work on the exploited sites, in accordance with Article 11 of the said decree. As at 15 October 2021, this law is under revision.

In accordance with the provisions of the 2015 Law on Quarries (No. 27-13), the opening and operating of quarries require a prior declaration of operations. The declaration must be accompanied by specifications that include health, safety and preventative measures as well as the modalities for the rehabilitation of sites after closure. According to this law, quarries fall under the provisions of the Law on EIA (No. 12-03) and its implementation regulations. EIAs must be conducted by a consultancy firm certified for EIAs. Furthermore, quarries also require a public inquiry, initiated by a public administration. Thus, Recommendation 4.4 of the first EPR, which called on the Government to adopt new legislation to ensure adequate EIA prior to

the start of quarrying operations and rehabilitation measures at the end of operations, was met with the adoption of the Law on Quarries.

In accordance with the Law on Water (No. 36-15), the use of natural mineral or thermal springs, as well as the abstraction of spring water for commercial purposes, are subject to a concession regime. The relevant ABH draws up the concession contract, which stipulates the flow rate, fee and payment conditions, and the term of the concession (which may not exceed 30 years but can be extended) and the volume or surface area conceded.

Ozone-depleting substances

In line with the Montreal Protocol on Substances that Deplete the Ozone Layer, the Ministry of Industry and Trade uses an annual quota system to issue permits for the importation of chlorofluorocarbons (CFCs).

Radioactive sources

In accordance with the Law No. 142-12 on Nuclear and Radiological Safety and Security, the authorization and control regime for radioactive sources covers:

- The design, construction, commissioning tests, operation and maintenance, and the shutting down and decommissioning of facilities using radioactive materials;
- The manufacture, acquisition, importation, exportation, transport, transit, distribution, holding, use, transfers (be they free of charge or for consideration), storage and disposal of ionizing radiation sources;
- The management of radioactive waste;
- The extraction and processing of radioactive ores.

Integrated permits

Morocco does not have a system for the granting of integrated environmental permits based on best available techniques (BAT) for large industrial installations.

2.2 Environmental impact assessment

National context

The introduction of EIA was heralded by the adoption of Law No. 12-03 in 2003. However, the decrees implementing this law were not adopted until 2008. The relevant regulations include Decree No. 2-04-563 on the powers and functioning of the national and regional EIA committees and Decree No. 2-04-564

setting out the procedures for organizing and conducting public inquiries relating to projects subject to EIA.

Law No. 49-17 on Environmental Assessment was adopted in 2020 to remedy the shortcomings of Law No. 12-03 on EIA. It defines environmental assessment as a study that integrates the environmental and social aspects of a project, plan or programme or of public policy, which can be used to evaluate any foreseeable impacts and to consider and argue for acceptable solutions. This law also corrects the shortcomings of the previous law by providing for SEA, EIA, EISs and environmental audit.

Projects likely to be undertaken by a natural or legal person – public or private – which, for reasons of their nature, size or location are likely to have negative environmental, health and safety effects, are subject to an EIA. Consequently, also subject to an EIA are the dismantling of, substantial modifications to, and change of location or extension of, projects subject to EIA. National defence projects do not require an EIA but are nonetheless required to take into consideration their impact on the environment and on public health.

The projects subject to EIA established by the Annex to Law No. 12-03 remain valid until a new list with a description of projects subject to EIA is adopted. Currently, projects subject to EIA fall into the following five categories:

- Unhealthy, inconvenient or dangerous industrial facilities classified as category 1;
- Infrastructure projects, including storage, waste disposal and liquid sanitation facilities;
- Industrial projects, such as mining, energy, chemicals, metal processing, food products, textiles, leather, wood, paper, cardboard, pottery and rubber;
- Agricultural projects;
- Aquaculture and fish farming projects.

This list, used to identify projects subject to EIA, fails to include several related project categories, such as oil and gas pipelines, water supply systems, wind farms and quarries other than sand/rubble (e.g., limestone, granite and marble). As the list is not determining, it allows a significant number of development projects to bypass the EIA process. Also, the failure to specify critical project thresholds on the list, such as production thresholds for mining and quarry projects subject to EIA below which the project would be subject to an EIS remains problematic.

The Law on Environmental Assessment (No. 49-17) requires that EIA must consider several elements, which include:

- A qualitative and quantitative assessment of liquid discharges, gas emissions, hazardous and non-hazardous waste, as well as noise, light and odour nuisance and heat and radiation damage likely to occur during the implementation or operation of the project as well as during an extension or decommissioning phase; and
- A monitoring and follow-up programme for the project that includes the measures to be taken that are in line with the technical and environmental requirements used for the study.

To execute projects subject to EIA, the party requesting authorization must first submit the decision on environmental acceptability. The procedures necessary for obtaining environmental acceptability status have yet to be established by regulation. The decision on environmental acceptability of the project must be accompanied by the environmental specifications, which set out the measures to be taken to reduce or compensate for the negative environmental and social impacts of the project, as well as the methods for monitoring these measures. The condition that EIAs must be carried out by certified consultancy companies is a recent requirement that is expected to have positive consequences on the quality of EIAs.

The current EIA process is comprised of the following steps: (i) project notification; (ii) screening; (iii) establishing scope; (iv) defining the terms of reference; (v) drafting of the EIA report; (vi) EIA report review; and (vii) decision on the environmental acceptability of the project. The process is typical for EIAs. Process deadlines are inadequate, however, especially the deadline for the preparation of additional information that may be requested by the administration, which is left entirely to the discretion of the party requesting a permit. Moreover, the scoping stage is not clearly covered by the regulations in place.

In order to provide guidance for the EIA procedures, the Department of Sustainable Development has prepared an EIA reference manual comprised of:

- A review procedures manual for reviews conducted by national and regional committees;
- An EIA public inquiry procedure manual;
- An EIA evaluation guide.

Besides, the Department of Sustainable Development has prepared EIA guidelines for the following sectors:

- Linear infrastructure projects (national roads and motorways);
- Tourism projects;
- Projects for the creation of industrial units;
- Projects for the development of industrial zones;
- Regulated landfill projects;
- Aquaculture projects;
- Projects for WWTPs and related works;
- Projects for the extraction of construction materials.

These sectoral guidelines, available to developers and accredited consultancy firms, are used to define the terms of reference for EIA reports. However, there are as yet no guidelines for various types of sectoral projects such as large-scale mining or oil and gas pipelines.

Projects that, by their nature, size and location, are likely to have small-scale negative impacts on the environment are subjected to an EIS, which has to be carried out by an accredited consultancy firm. This represents a significant step towards improving environmental protection as the EIS should include: a description of the initial state of the environment; an assessment of the positive and negative impacts of the project on the physical, biological and human environment during project phases; the measures to eliminate, reduce or compensate for the negative impacts on environmental and public health; and monitoring mechanisms. The list of projects subject to the modalities for implementation and the procedures relating to the EIS have yet to be established. Moreover, the permits or proof of EIS submission are only issued once the petitioner has submitted the decision on environmental acceptability.

With the adoption of Law No. 49-17, the National Commission for Environmental Assessment (CNEE) and CRUIs replaced the National EIA Committee (CNEI) and the associated Regional EIA Committees (CREIs), respectively, which had been created in accordance with Law No. 12-03 and its implementation Decree No. 2-04-563. The CNEE examines EIAs and issues an opinion on the environmental acceptability of projects of national scope, cross-border projects and projects covering several regions. The composition and terms of reference for the CNEE are yet to be determined by regulation. The CRUIs were created in 2019 by Law No 47-18 on the Reform of Regional Investment Centres and the Creation of Unified Regional Investment Commissions.

Previously, EIA reports were submitted to the CNEI or CREI for review and decisions on the environmental acceptability of the project. The

permanent members of these committees were representatives of the main governmental authorities who could invite other participants, such as the representatives of ABHs, unions and municipalities, and technical experts. The committees were composed of approximately 20 members. The use of external experts remains a rare exception due to financial restrictions, but is sometimes necessary, especially for large-scale industrial or infrastructure projects, when assistance is needed to make a well-informed decision. For example, the Department of Sustainable Development used external experts for a major wind power plant project. The decision on environmental acceptability is made by the environmental authority in the case of large projects (valued at more than 200 million dirhams) and of interregional or cross-border projects. For smaller projects, the decision is made by the regional authority.

Table 2.2 shows the number of EIAs reviewed and the number of environmental acceptability decisions granted by the CNEI and CREIs between 2012 and 2020. Approximately 60 per cent of the EIAs of the projects reviewed were granted environmental acceptability status. The remaining 40 per cent were turned down for the following reasons:

- Additional information was required on the project;
- The project was incompatible with urban planning guidelines;
- The project did not meet the requirements for environmental acceptability.

Public participation

Public participation in the EIA process takes place through public inquiries. A project requiring an EIA is

the subject of a public inquiry that is paid for by the party seeking a permit. During the inquiry, the population concerned can make observations and proposals regarding the possible impacts of the project on the environment. The conditions for the public inquiry are provided for by Decree No. 2-04-564 of 4 November 2008, which establishes how public inquiries are to be organized and conducted for projects subject to EIA. In application of the Decree, the party requesting a permit files a request to open a public inquiry with the permanent secretariat of the CREI, which is also the secretariat of the public inquiry commissions for EIAs ordered in its district. The following documents are submitted with the request:

- A description of the main technical characteristics of the project;
- A clear and comprehensible summary, for public consumption, of the information and main data contained in the EIA, in particular, any information on the positive and/or negative impacts of the project on the environment as well as the measures envisaged to eliminate, reduce or compensate for the harmful consequences of the project on the environment; and
- A map of the site indicating the boundaries of the area of foreseeable project impact.

Notwithstanding, regulations on the conduct of public inquiries do not require that EIAs be completed or submitted at the opening of the inquiry. Furthermore, inquiry submissions make no mention of taking into consideration the socioeconomic impacts of the project on communities or the need for a resettlement action plan for projects that call for population displacement (e.g., mining projects).

Table 2.2: Key information on EIAs, 2012–2020, number

Year	EIAs reviewed		Environmental acceptability decisions conferred	
	CNEI	CREIs	CNEI	CREIs
2012	37	590	15	349
2013	48	774	22	387
2014	60	682	39	307
2015	42	732	30	393
2016	43	737	19	373
2017	72	958	39	508
2018	53	1 227	34	763
2019	63	1 020	34	678
2020*	38	-	23	-
Total	456	6 720	255	3 758
Grand total	7 176		4 013	

Source: Department of Sustainable Development, 2021.

Note: CNEI: National Environmental Impact Assessment Committee; CREIs: Regional Environmental Impact Assessment Committees. At the time of writing, figures for the CRUIs, which replaced the CREIs in 2020, were not available.

The public inquiry is conducted by a commission chaired by the local administrative authority where the project would be implemented. The commission is composed of the president of the town council, a representative of the governmental authority in charge of the environment and a representative of each governmental authority in charge of the district. The president of the commission may ask any person or any public or private entity that can assist the commission in its task to join the deliberations. He/she may, at the request of the members of the committee and if the specific characteristics of the project call for it, ask for the opinion of an expert on certain aspects of the study.

Public inquiries last 20 days. After the 20-day period, the commission drafts a report on the public inquiry that contains a summary of the observations and proposals, relative to the project, made by the public. Regulations, however, do not provide for how the inquiry will be carried out or how the observations and proposals of the affected communities will be collected (e.g., public hearings, written comments). The public inquiry report and the register, signed by the members of the commission, are transmitted by the president to either the president of the CNEE (the CNEI before 2020) or the president of the CRUI (the CREI before 2020). The report must be transmitted within eight days of the closing date of the public inquiry. However, the eight-day period seems insufficient for the elaboration, in due form, of the public inquiry report.

It is worth noting that there is no information system in place with a computerized database to manage information on the EIA process. The lack of such a system prevents wider public access to EIA reports and better management of projects' environmental monitoring and follow-up programmes.

Deficiencies and implementation issues of the regulatory framework

The Law on Environmental Assessment (No. 49-17) corrected many of the shortfalls of the previous legislation on EIA. However, the lack of implementing legislation is an obstacle to the effective application of this law within a reasonable timeframe after its adoption. The EIA and EIS procedures and the provisions on the creation and functioning of the new CNEE have not yet been established. Similarly, as at June 2021, the revised list of projects subject to EIA and the list of projects subject to EIS have not yet been submitted for adoption. Also, the available sectoral guidelines for conducting EIA do not cover all major sectoral projects. The lack of specific sectoral terms of

reference limits the capacity of EIA drafters to focus on the most critical aspects of the project and its scope.

Other important shortcomings of the Law on Environmental Assessment are the lack of requirements to calculate GHG emissions and to establish measures to monitor and reduce the impact of GHG emissions, for projects subject to EIA. Nor does the Law specifically require the analysis of the alternative “no project option”. In addition, the Law does not require the submission of an environmental report (annual or quarterly) for projects that have obtained environmental acceptability status subsequent to an EIA. Neither does it provide for the establishment of an information system to manage data on EIA processes, facilitate public access to information and strengthen environmental monitoring and follow-up of projects.

It is worth noting that the 10-day period given to submit the EIA reports to the committee is not sufficient. The examination of certain studies may take longer because of the complexity of some projects. The time given for the committee to produce its decision on the environmental acceptability of the project, 20 working days, also seems short, for the same reason.

Additionally, failure to provide for stricter internal quality control procedures (including ISO certification) may compromise the quality of EIAs. The lack of institutional capacity, particularly in terms of training and human resources, within the Department of Sustainable Development and the EIA review committees at the national and regional levels, can also affect the quality of EIAs. For example, the Environmental Assessment Division, which is in charge of EIA, environmental auditing and SEA nationally, has only six people to carry out its tasks.

The link between public inquiries and the EIA process is not explicit. Whether or not public inquiries should take place after EIA reports have been completed, containing identified impacts and mitigation measures, is not clear. The decree on public inquiries does not mention the social impacts of a project or the need to elaborate a resettlement action plan for projects requiring the displacement of populations (e.g., mining projects, large-scale infrastructure projects). Moreover, neither the implementation modalities for public inquiries nor the collection of observations and proposals from the affected communities (e.g., public hearings, written comments) are mentioned. Finally, the eight-day period for the preparation of the public inquiry report is not sufficient, especially in the case of large-scale projects.

Cross-border context

Law No. 49-17 on Environmental Assessment stipulates that the CNEE is responsible for examining EIAs and determining environmental acceptability for transboundary projects. To date, there are no regulations on transboundary EIAs.

2.3 Environmental standards

Emission standards

Air

Pursuant to the Law on Combating Air Pollution (No. 13-03), Decree No. 2-09-631, which established limit values for the release, emission or discharge of pollutants into the air from stationary sources and the procedures for their control, was adopted in 2010. The GELVs for air pollutants covered by the Decree are for: dust; inorganic substances, mainly in the form of dust; inorganic substances in the form of gas or vapour; organic substances in the form of gas, vapour or particles; and carcinogenic substances. Under certain conditions, the governor of the province or prefecture concerned by the emission of air pollutants may propose the setting of SELVs that are more restrictive than those provided for in the Decree. Overall, more restrictive values are established by a joint order of the governmental authority for the environment and the governmental authority that oversees the sector concerned. Consequently, GELVs established by the Decree would not apply to installations for which less-stringent SELVs have been set by joint orders of the ministry in charge of the environment and the sectoral ministries concerned.

From a legal point of view, the cement and ceramics industries are the only sectors to have established SELVs, through the adoption of Joint Ministerial Order No. 1504-18 of 21 May 2018 setting specific limit values for the release, emission or discharge of pollutants into the air from cement production facilities and from cement production facilities using waste co-incineration. The SELVs for pollutants from the cement industry are dust, sulphur dioxide (SO₂), nitrogen oxide (NO_x), total volatile organic compounds (TVOCs) and heavy metals. These limit values, however, are not based on the existing techniques used in cement production; techniques vary and determine the type and amount of emissions, which may be lower depending on the technique applied. Also, SELVs for the cement industry do not cover all necessary parameters (e.g., total dust, HF,

HCl, dioxins and furans). The limit values are, for the most part, less restrictive than those for the cement industry in European Union countries. In Germany, for example, the ELV is 50 mg/Nm³ for SO₂ and 200 mg/Nm³ for NO_x.²⁰ These values are lower than those in Morocco: 500 mg/Nm³ for SO₂ and 1200 mg/Nm³ for NO_x (table 2.3). Similarly, the European Union limits are stricter than those of Morocco: 50–400 mg/Nm³ for SO₂ and 200–450 mg/Nm³ for NO_x.²¹

The joint Order of the Minister of Energy, Mines and the Environment and the Minister of Industry, Trade and the Green and Digital Economy No. 2323.20 (7 September 2020) was adopted setting the sectoral limit values for emissions, releases and discharges of pollutants into the air from activities in the ceramics sector.

Other sectors (e.g., iron and steel, brickworks and oil refineries) are in the process of establishing regulatory SELVs in consultation with the competent authorities. However, developing and adopting SELVs is a time-consuming process that calls for greater efficiency in order to accelerate the application of the SELVs for all industrial sectors. Also, the granting of long grace periods to comply with the law for existing pollution sources hampers a more efficient process.

Table 2.3: Specific emission limit values for selected cement industry pollutants, mg/Nm³

	SO ₂	NO _x
Morocco	500	1 200
Germany	50	200
EU	50–400	200–450

Source: Joint Ministerial Order 1504-18 of 21 May 2018; Edwards, P. “Global cement emissions standards”, *Global Cement Magazine*, March 2014.

Emissions from mobile sources are regulated by Decree No. 2-97-377, which amended the 1953 decree on traffic police. The Decree sets limits for emissions of carbon monoxide (CO) (4.5 per cent) and smoke (opacity set at 70 per cent maximum). It also defines verification procedures and technical conditions and provides for unannounced pollution controls on roads. However, the Decree has not yet been implemented.

Water

The new Law on Water (No. 36-15) entered into force through Dahir No. 1-16-113 of 10 August 2016. In the application of the previous Law on Water (No. 10-95) and its implementation decrees, which remain in force until the publication of the regulations for the new

²⁰ Edwards, P. “Global cement emissions standards”, *Global Cement Magazine*, March 2014.

²¹ Ibid.

Law, several standards have been adopted and published. The standards define water quality and establish limit values for liquid discharges. The discharge limit values can be general (GDLVs) or specific (SDLVs) to certain industrial sectors or to households. The process of setting SDLVs consists of three steps:

- Drafting of the technical dossier by the DGE;
- Consultation and validation by the national committee on which sit the industrialists concerned, and representatives of the ministerial departments in charge of water, the environment, industry, the interior and any other department concerned;
- Drafting and publication of ordinances.

There are currently eight SDLVs covered by ordinances, in application of Decree No. 2-04-553 of 24 January 2005 on spillages, run-offs, discharges and direct or indirect deposits in surface or underground waters. The eight SDLVs cover:

- Household liquid discharges (adoption order in 2006);
- The sugar industry (adoption order in 2006);
- The paper pulp and cardboard industry (adoption order in 2006);
- The cement industry (adoption order in 2009);
- The surface finishing industry (adoption order in 2010);
- The textile industry (adoption order in 2017);
- The paint, varnish, lacquer and ink industry (adoption order in 2017);
- The ceramics industry (adoption order in 2017).

Generally, SDLVs²² are less stringent than GDLVs. Sectors that do not yet have SDLVs are obliged to comply with the relevant GDLVs. Other standards for industrial discharges are currently being prepared, deliberated or adopted. The draft ordinances that set SDLVs for oil refineries and yeast production, which were drafted in 2014 once they had been endorsed by the representatives of industry on the national committee, have yet to be published. There are also several SDLVs currently being discussed with the representatives of industry, which cover fertilizer production, the pharmaceuticals industry, mining, pesticides, wood processing, glass, batteries (primary and secondary cells), ferrous and non-ferrous metal foundries, chlor-alkali chemicals, dairies and cheese factories, flour mills and alcohol distilleries.

The first EPR mentions the existence of draft decrees and SDLVs under discussion which, many years later, have still not been adopted. This is indicative of the difficulties encountered at certain stages of the process of determining specific limit values for liquid discharges, which are at the root of considerable delays in the adoption of the ordinances. The consultation and validation phase undertaken by the national committee that brings together industrialists and ministerial departments in order to negotiate the SELVs seems to be problematic, given the blockages with various limit values. Additionally, the problems with the publication of the decrees that have been discussed and endorsed, points to significant defects in the process: the procedures for the promulgation of laws are too slow. Consequently, SDLVs and the polluter-pays principle are not being applied as required by the law; water pollution levels continue to be high, and the competent authorities have problems controlling them.

GDLVs for industry were only adopted in 2013 (18 years after the promulgation of the 1995 Law on Water (No. 10-95)), by Joint Ministerial Order No. 2942-13 of 7 October 2013, which set general limit values for discharges to surface and groundwater. Subsequently, with the adoption of Joint Ministerial Order No. 3286-17 in 2018, the Order was amended to make some general limit values less stringent (Joint Ministerial Order of the Minister of the Interior, the Minister of Industry, Trade and New Technologies, the Minister of Equipment, Transport and Logistics and Water, the Minister of Energy, Mines and Sustainable Development, and of the Minister of Air Transport, Crafts and Social Economy, No. 32869-17 of 4 September 2017 setting the general limit values for discharge into surface or groundwater modifying Order No. 2942-13 of 7 October 2013 setting the general limit values for discharge into surface or groundwater).

These standards published in 2018 were prepared and adopted based on an evaluation of the standards, which brought to light difficulties in the application of certain parameters such as those for total phosphorus, fluorides, suspended solids (SS) and chemical oxygen demand (COD). Also, Moroccan industrialists communicated to the authorities the difficulties that arise from the implementation of the standards adopted in 2013 and asked for less stringent standards. Consequently, the limit values not to be exceeded were increased from 30 mg/l to 100 mg/l for SS, and from 3 to 20 mg/l for fluorides. It is currently difficult

²² Preservation of the quality of water resources and pollution control; emission limit values applied to discharges (Pollution standards), Minister of Energy, Mines, Water and the Environment in charge of Water, June 2014.

to assess these standards as the flow thresholds that discharges should not exceed are not provided.

Noise

Law No. 11-03 stipulates that noise and sound vibrations, regardless of their origin or nature, that can cause harm to the neighbourhood, human health and the environment in general must be eliminated or reduced. There are no legislative or regulatory provisions, however, on noise level limits acceptable in neighbourhoods or on the maximum levels of noise from regulated installations in relation to ambient noise.

According to Ministerial Order No. 93-08 of 12 May 2008, which establishes general and specific implementation measures for the principles set out in articles 281 through 291 of the Labour Code, employers must measure the noise that employees are exposed to with a view to identifying employees for whom daily noise exposure reaches or exceeds 85 dB or for whom peak sound pressure reaches or exceeds 135 dB. For such employees, employers must measure daily noise exposure and, where appropriate, peak sound pressure.

Environmental quality standards

Air

The objective of Law No. 13-03 on Combating Air Pollution is to prevent and combat the emission of atmospheric pollutants that are likely to harm human health, wildlife, soil, climate, cultural heritage and the environment in general. The implementation Decree, No. 2-09-286 of 8 December 2009, sets air quality standards and air monitoring procedures with the aim of implementing air quality standards and defining the procedures for the creation of air quality monitoring networks. The standards stipulate the type of pollutant (SO₂, NO_x, CO, suspended solids, lead (Pb), cadmium (Cd), O₃ and benzene) and threshold objectives (protection of health, ecosystems or plant life).

Pursuant to the application of the Decree, two new ministerial orders were adopted in 2014. The first, Joint Ministerial Order No. 1653-14 laying down the conditions and procedures for calculating the air quality index, concerns the conditions and methods for calculating the air quality index. The air quality index is determined by measuring concentration levels for four pollutants: SO₂, NO₂, ozone (O₃) and fine particles with a diameter of less than 10µm (PM₁₀). The index is calculated using data from measuring stations selected for this purpose. The index ranges from 1 to 10 and is colour coded. For example, a score of 1 (very good quality) is associated with dark green and a score of 10 (very poor quality) is associated with red.

The second is Joint Ministerial Order No. 3750-14 laying down information thresholds, alert thresholds and arrangements for implementing emergency measures relating to air quality monitoring. The information thresholds and alert thresholds (table 2.4) are determined by concentrations of SO₂, NO₂, O₃ and PM₁₀. The Decree is of paramount importance because it gives the Standing Committee on Air Quality Monitoring and Surveillance the power to use all available means to inform the public when concentrations of one or more of these pollutants reaches the information threshold. The information brought to the attention of the public is:

- Name of the air pollutant(s);
- Level(s) of concentration of the air pollutant(s);
- Date, time and location of the peaks above information thresholds;
- Reasons for which concentrations went above thresholds, if known;
- Geographic area affected by concentrations above thresholds;
- Air pollution forecast;
- Health recommendations for persons most at risk from short-term exposure to the pollution.

Table 2.4: Air quality information and alert thresholds, µg/m³

	Information thresholds	Alert thresholds
SO ₂	350 (1-hour average)	550 (3-hour average, consecutive hours)
NO ₂	200 (average measured in one hour)	400 (average measured in one hour)
PM ₁₀	150 (average measured over 24 hours, from 8:00 to 8:00 on the following day and from 14:00 to 14:00 of the following day)	200 (average measured over 24 hours, from 8:00 to 8:00 on the following day and from 14:00 to 14:00 on the following day)
O ₃	250 (average measured in one hour)	260 (average measured in one hour)

Source: Joint Ministerial Order No. 3750-14 of 29 October 2014.

Photo 2.2: Information board on development works for the reception of the public in the Bab Rmila site at Zerhoun, a site of biological and ecological interest



Photo credit: Department of Sustainable Development

Similarly, when concentrations of one or more of the above-mentioned polluting substances exceed the alert thresholds, the Standing Committee on Air Quality Monitoring and Surveillance advises the *wali* or governor to take all necessary emergency measures to limit the extent and effects of the pollution peak on the population. The information threshold and the alert threshold are considered as having been reached when they are recorded by at least two stations at the same time. One of the stations must be a background pollution station, the purpose of which is to record the characteristics of the ambient air in each geographic area. Stations that measure background pollution must be located away from the direct sources of local pollution.

Water

Pursuant to Decree No. 2-97-787 of 4 February 1998 on water quality standards and the inventory of levels of water pollution, several water quality standards set out the requirements for aquatic environments according to use. The standards cover the quality of:

- Surface water used to produce potable water;
- Water used for irrigation;
- Water used for fish farming;

- Surface water.

Joint Ministerial Order No. 1277-01 of 17 October 2002 sets down quality standards for surface water used to produce potable water and defines five categories, based on several water quality parameters, as well as treatment methods for each category. Quality standards for irrigation water are set down in Joint Ministerial Order No. 1276-01 of 17 October 2002. Water quality standards for fish farms are set down in Ministerial Order No. 2028-03 of 5 November 2003. The classification system for surface water, based on pollution indicator parameters, is established in Joint Ministerial Order No. 1275-01 of 17 October 2002, which also contains a table for surface water quality that is used as a reference for water quality inventories. Currently, the classification system is only used as a tool for water quality assessment and not for management and planning.

Soil

As at 1 June 2021, there were no national standards for soil pollution, but work is under way on a draft law on soil protection.

Product standards

Toy safety

Moroccan standards on toy safety were established by Order No. 2575-14 of 16 July 2015. The standards contain specific requirements regarding the physical, mechanical, chemical, flammability, electrical, hygienic and radioactive properties of toys.

Food safety

IMANOR developed the standard used to evaluate and control critical food safety hazards: HACCP²³: NM 08.0.002: HACCP management system – requirements. The standard provides for risk assessment and the implementation of control and monitoring measures with a view to guaranteeing food safety. In accordance with the requirements of the HACCP standard NM 08.0.002, NM HACCP certification aims to verify the implementation of the food safety system. Prior to its implementation, IMANOR applied the hygiene standard NM 08.0.000: General Principles of Food Safety.

Emission and fuel standards for vehicles

Morocco has modified its list of marketable fuel products. Since 2009, two types of fuel are marketed through the national network of service stations: 50 ppm diesel and unleaded gasoline. Low sulphur 50 ppm diesel (Euro 4) replaced 350 ppm diesel. To improve air quality, particularly in urban areas, the country has aligned its standards with international product standards.

The country continues its commitment to reducing polluting emissions from motor vehicles and plans to switch to the use of Euro 6b standards for passenger cars and light commercial vehicles, and Euro VI for heavy goods vehicles from 2023. The change in emission standards will also concern 2 and 3-wheel vehicles.

2.4 Environmental compliance

Environmental self-monitoring

The definition of environmental self-monitoring obligations varies across legislation. This is detrimental to their coherence and, consequently, to the effective fulfilment of these obligations.

Law No. 12-03 requires EIAs to comprise environmental “monitoring and follow-up”

programmes for each project. Similarly, Law No. 49-17 requires the elaboration of “monitoring and follow-up” programmes as part of the EIA, for each project. Neither law, however, requires periodic reports, on the implementation of said programmes and based on self-monitoring data, to be transmitted to the competent authorities.

Pursuant to Law 11-03, public authorities may require the operators of regulated facilities to install pollution measurement devices and to provide periodic reports on the nature and quantity of liquid effluents, gas emissions and solid waste. These requirements are not systematically imposed on industrialists, however.

Additionally, despite the implementation of environmental standards for gas emissions from fixed sources, self-monitoring by emitters (polluters) is not a legal obligation. Decree No. 2-09-631 of 2010 on limit values for the release, emission or discharge of pollutants into the air from stationary sources of pollution and the procedures for their control, stipulates that, to verify compliance with limit values, operators may self-monitor atmospheric pollutant emissions from their own facility. In such cases, the pollutants to be monitored are, at a minimum: SO₂, particulate matter (PM), NO_x, Pb, CO and Cd in dust. There are also provisions for the submission of annual reports to the competent authorities.

Self-monitoring is clearly mandatory for waste (Decree No. 2-09-284 of 2009). During the lifespan of a landfill, operators are under the obligation to conduct physicochemical and bacteriological laboratory tests for air quality and groundwater and surface water quality. Test results records are kept for a period of three years. Operators must draft annual activity reports and transmit them to the appropriate authorities: the *wali* of the region or the governor of the prefecture or province concerned for class 1 landfills, and to the public authority in charge of the environment for class 1, 2 and 3 landfills. Annual activity reports must include a section on waste disposed of and self-monitoring measures carried out at landfills.

Water legislation (Law No. 36-15) clearly stipulates that the wastewater discharge locations, sampling methods, and number of tests analyses performed by an accredited laboratory relating to self-monitoring must be included in the discharge permit. However, the submission of regular reports on liquid discharge data from industrial sources is not required. Similarly, Law No. 81-12 on the Coastal Zone requires the keeping of a register on discharges for which the

²³ Hazard analysis and critical control points.

holder of a discharge permit is responsible but does not require regular reporting of such data.

As for the environmental self-monitoring of quarries, quarry legislation introduced in 2015 requires operators to submit annual reports, prepared by accredited consultancy firms, on the environmental situation of the quarries they operate. A standard report template is expected to be set by decree. Upon review of these reports, public authorities may request that operators update the EIA for the quarry, using as a basis the written comments provided by the public authorities.

In practice, self-monitoring arrangements are either specified in project specifications or contained in an agreement signed with the Department of Sustainable Development. The cement sector, for example, communicates data on emissions and discharges to the Department of Sustainable Development on a quarterly and half-yearly basis in application of their agreement. But this is a rare situation as most sectors do not have an agreement in place. Establishing covenants with the different industrial sectors is a laborious process and requires considerable time for negotiation until signing. Despite the efforts made by the Department of Sustainable Development, it takes several years to reach a signed agreement.

At present, the Department of Sustainable Development does not have a computerized database for the environmental monitoring of industrial installations. It does have a database consisting of Excel tables for gas emissions, notably for the cement industry. At present, the information cannot be used for planning inspections. Also, currently there are no harmonized templates for reporting self-monitoring data in a format that could be easily integrated into a future computerized system.

Environmental audits

As at 1 June 2021, environmental audits are used exclusively by industrial facility operators and operators working in areas that existed before the publication of Law No. 49-17, that are subject to EIAs but do not have environmental acceptability status (article 17). Environmental audits are conducted by certified consultancy companies. Deadlines for environmental audits, which are compulsory, have yet to be defined. Moreover, neither the methods nor the procedure for determining compliance have been established, although the adoption of such regulations is crucial to the effective implementation of environmental audits. The environmental audit contains the following information:

- A description of the main components of the industrial facility or economic activity and their characteristics;
- A description of the nature and quantity of raw materials and energy used and of the manufacturing processes, if any;
- The nature and quantity of liquid discharges, gas emissions, hazardous and non-hazardous waste, and noise, light, odour, heat and radiation pollution caused by the running of the industrial facility or economic activity subject to the environmental audit;
- The measures to be taken and alternative solutions to be adopted to eliminate, reduce or compensate for the negative effects of the industrial facility on the environment and the health of the population, as well as the measures aimed at enhancing the positive impacts of the facilities;
- An executive summary of the audit report.

Nevertheless, requirements for the development of an environmental management plan, including an environmental monitoring programme, and the assessment of GHG emissions are still lacking.

Furthermore, the environmental audit is an effective instrument that is used to monitor and control activities subject to EIAs. It is usually required for the renewal of environmental permits or periodically (e.g., every five years) to update environmental monitoring programmes. These essential functions, however, are not addressed by the Law on Environmental Assessment.

The environmental audit report must be submitted to the public authorities in order to obtain a decision on environmental compliance for the industrial facility or activity. In 2017, a study was conducted on behalf of the Directorate of Monitoring, Environmental Assessment and Legal Affairs of the new Department of the Sustainable Development on the elaboration of the environmental audit process. It was used as a basis for the drafting of a manual that specifies the tools, steps, role of the different actors and contents of the environmental audit report.

Inspections

Environmental inspections

The Environmental Police is in charge of enforcing compliance with environmental regulations. Created by article 35 of Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development, the Environmental Police works under the authority in charge of the environment. Decree No. 2-14-782 of 19 May 2015 relating to its structure

and functioning stipulates that the Environmental Police is in charge of controls, inspections, searches, investigations and the recording of offences and issuance of fines, pursuant to the provisions of Law No. 11-03 (Protection and Conservation of the Environment), Law No. 49-17 (Environmental Assessment), Law No. 13-03 (Combating Air Pollution), Law No. 28-00 (Waste Management and Disposal) and Law No. 81-12 on the Coastal Zone. As regards liquid discharges, the Water Police is in charge of controlling wastewater discharges.

Decree No. 2-14-782 sets out the procedure for environmental inspections. Environmental police inspectors carry out their duties unannounced, at the request of the governmental authority in charge of the environment or within the framework of the National Environmental Control Plan (NECP). Sometimes joint inspections, referred to as “mixed inspections” because they involve different institutions, are conducted.

Prior to the introduction of the annual inspection programme by the NECP in 2019, on-site inspections were mostly sporadic or in response to requests or complaints. Planned inspections were very limited and concerned only follow-up checks on facilities that had obtained environmental acceptability after an EIA, projects with Fund for Industrial Depollution (FODEP) funding (chapter 3), and subject-specific inspections (e.g., WWTPs, controlled landfills) (box 2.1).

The NECP is prepared by the environmental authority after consultation with other relevant authorities and covers a one-year period. The purposes of the plan are to:

- Identify priority sectors and sector branches for environmental inspections; delimit geographical areas and select installations or operations to be inspected based on environmental concerns and risk analyses;
- Elaborate a multi-year capacity-building programme to strengthen human and material resources with a view to ensuring environmental controls and inspection operations; and
- Create, harmonize and simplify tools used for documentation research, investigations and the recording and sanctioning of breaches of environmental protection legislation.

However, the lack of data on regulated installations the activities of which pose a significant risk to the environment and to surrounding communities is an obstacle to the implementation of a risk-based inspection programme. Descriptions of each facility containing general and technical information, compliance history data and findings from environmental monitoring and follow-ups are not yet available. Furthermore, the Department of Sustainable Development does not have a computerized database to store and manage this type of information, as prescribed in Decree No. 2-14-782. The collection of this type of information would make it possible to create a PRTR that could be used to prioritize environmental inspections more effectively.

Box 2.1: The 2016 environmental compliance verification campaign for wastewater treatment plants and landfills

In 2016, the Directorate of Monitoring, Environmental Assessment and Legal Affairs of the then Department of the Environment organized an environmental compliance monitoring campaign for WWTPs and landfills. The main objectives were to verify their compliance with the provisions of Law No. 12-03 on EIA and Law No. 28-00 on Waste Management and Disposal, as well as with the objectives set by the PNA and the PNDM. This campaign was implemented jointly by the LNEP, in collaboration with the Regional Environmental Services and relevant regional authorities. Seven WWTPs and eight landfills were inspected.

Compliance verification operations for WWTPs consisted of: (a) observing the state of operations, identifying possible malfunctions and proposing solutions to remedy the problems; (b) examining operating conditions and assessing environmental impacts; (c) determining the degree of compliance; and (d) making recommendations.

The compliance audit of the controlled landfill component aimed to verify: (a) the commitments prescribed in the environmental specifications signed with the municipality concerned; (b) the actual operating conditions of the landfill and its suitability to receive household and/or other types of waste; and (c) the implementation of the commitments of the company managing the landfill. The main commitments verified concerned the implementation of regulatory, safety and monitoring measures to prevent pollution and disturbances; regular quality control and monitoring of discharges and emissions (liquid and gas); vaccination of landfill staff to prevent infections and the spread of viral diseases; regular maintenance of the facilities; and the treatment of leachates and odours.

Source: Department of Sustainable Development, 2021.

Environmental Police inspectors contribute to the implementation of the NECP through a supervisory committee set up for this purpose. The Environmental Police also draws on the expertise of the LNEP during inspections that require sample collection and testing. In particular, the laboratory conducts tests on atmospheric emissions from stationary sources and on discharges from WWTPs and industrial plants. The laboratory may also be asked by the Environmental Police to participate in the investigation of specific pollution-related events (e.g., air pollution, the impact of mining on water resources, fish mortality and surface water pollution).

The first National Annual Environmental Control Plan (PNACE) was created in 2019, further to an in-depth study carried out by the Department of Sustainable Development. The Plan targeted 1,273 industrial sites identified as environmental monitoring priorities. These are mainly industrial production and processing plants, hazardous and non-hazardous waste treatment and disposal facilities, WWTPs and olive mills. From June 2019 to February 2020, 269 sites were inspected, and the Department has programmed the inspection of 1,004 industrial sites in 2021 (a total of 1,273 sites) and 1,559 sites in 2022. PNACE findings for 2019–2020 indicate that 38 per cent of the inspected industrial sites complied with regulations, while 47 per cent did not (table 2.5). Despite this high rate of non-compliance, only three industrial facilities were fined by Environmental Police inspectors.

The entities in charge of joint execution of the PNACE are the Directorate of Monitoring, Environmental Assessment and Legal Affairs, the Regional Environment Directorates (DREs), local authorities and the Royal Gendarmerie (Environmental Brigade). Regional execution of the PNACE is headed by the Environmental Police inspectors assigned to the DREs.

To ensure the transparency of control procedures and of public information mechanisms, environmental authorities publish on their website annual reports on the activities of the Environmental Police, but this work is only partially done.

Recommendation 2.3 of the first EPR on the strengthening of compliance monitoring has been only partially followed through the implementation of the PNACE. Standardized self-monitoring and self-reporting requirements remain unclear and ambiguous and are not applied to all sectors, as at 1 June 2021.

Officers wishing to be assigned to the Environmental Police and become inspectors must have at least five years of service as a level 2 administrator or level 1 state engineer and have successfully completed continuing education in environmental inspection techniques. They must also swear an oath pursuant to current legislation on the swearing in of law enforcement officers. Since the first EPR, the total number of sworn environmental inspectors has increased from 25 to 45. The Department of Sustainable Development plans to swear in approximately 100 new Environmental Police inspectors by the end of 2021.

Nationally, there are currently 17 inspectors (there were 12 in 2012). The number of regional inspectors has increased from 13 to 28 across the country's 12 regions, although unequally. For example, there are five inspectors in the Casablanca region but only one in the South region. The Environmental Police does not have sufficient human, material and financial resources or technical skills (specific to different industrial sectors) to undertake compliance monitoring effectively.

Table 2.5: PNACE site inspections for the period 2019–2020, number

Region	Sites inspected	Non-existent sites	Closed sites	Compliant sites	Non-compliant sites
Rabat-Salé-Kenitra	15	5	-	6	4
Casablanca-Settat	28	5	3	12	8
Marrakesh-Safi	16	1	2	3	10
Souss-Massa	29	4	1	11	13
Beni-Méllal-Khenifra	6	-	-	3	3
Laâyoune Sakia Lhamra	3	-	-	2	1
Dakhla Oued Eddahab	4	-	-	1	3
Guelmim Oued Noun	2	-	-	-	2
Fés-Meknés	131	2	9	51	69
Tangier-Tétouan-Al Hoceima	28	-	6	11	11
Daraa-Tafilalet	3	-	-	2	1
Oriental	4	1	1	-	2
Total	269	18	22	102	127
Percentage	100	7	8	38	47

Source: Department of Sustainable Development, 2021.

Photo 2.3: Rewarding environmental action, ministry in charge of the environment*Photo credit: ECE EPR Team*

CITES, forestry, hunting and fishing permit inspections

The Department of Water and Forests monitors compliance with the requirements of importation and exportation permits for CITES-listed species, and for forestry, hunting and fishing permits.

Industrial safety inspections

Pursuant to Dahir No.97 of 25 August 1914 concerning unhealthy, inconvenient and dangerous industrial facilities, regulated facilities are subject to the control and supervision of the relevant administrative authority. Inspections of industrial sites are also performed by Judicial Police officers. Inspections are carried out before commencement of operations (a priori controls) and during operations. They can also be carried out in cases of failure to comply with the obligations and conditions provided for in laws or regulations (a posteriori controls).

Environmental inspections of mines and quarries

Current legislation on mining and quarrying establishes that the mining licence and the quarry declaration are subject to a prior EIA. The EIA

contains an environmental management and monitoring programme, and its implementation may be monitored by environmental authorities, pursuant to applicable legal provisions. In addition, Decree No. 2-14-782 stipulates that the Environmental Police oversees the control, inspection, search, investigation, and recording and sanctioning of offences provided for in various laws. The Environmental Police must also provide the necessary support to strengthen the power of the public authorities involved in the application of specific environmental protection provisions contained in legislation. Law No. 33-13 on Mines, however, stipulates that the control of compliance with its provisions and with conditions relating to safety, hygiene, environmental protection and technical conditions for mining is the responsibility of government agents commissioned and sworn in for this purpose.

In practice, however, the Environmental Police do not carry out environmental inspections of mines and quarries. Currently, environmental and mining authorities do not conduct joint inspections.

Non-compliance measures

The adoption of Law No. 49-17 on Environmental Assessment established a process for determining non-

compliance, with specific deadlines. In cases of non-compliance with the provisions of the Law or its enforcement instruments, or with the specifications annexed to the decision on environmental acceptability and the decision on environmental compliance, the Judicial Police officer or the Environmental Police inspector establishes the breach. A report is then sent to the governor of the prefecture or of the province concerned within a period not exceeding 10 working days. The governor shall give notice to the violator within a period not exceeding 15 working days from the date of receipt of the report of the violation and shall set a deadline for the violation to be resolved. If the violator does not comply with the formal notice within 30 days of the date of notification, the governor of the prefecture or province shall transmit the report of the violation to the public prosecutor's office for the purpose of initiating public proceedings. In urgent cases, the governor may order the cessation of operations or activities until a decision is handed down by a competent court.

In Morocco, in cases of environmental non-compliance, administrative sanctions are widely applied, rather than criminal sanctions. Administrative sanctions include fines, suspension or withdrawal of a licence or permit, and temporary or permanent closure of an establishment.

Criminal sanctions for violations of environmental protection legislation are decided by a judge and can take various forms. Fines and imprisonment are the two main sanctions provided for in Moroccan legal texts. The amounts of the fines vary widely. For example, violations of the provisions of the articles of Law No. 28-00 on Waste Management and Disposal are punishable by fines ranging from 200 dirhams to 50,000 dirhams and/or prison terms ranging from a few months to years, depending on the gravity of the offence, while fines for air pollution can reach 200,000 dirhams. However, penalties for environmental offences, including imprisonment, are rarely applied. Morocco does not have environmental courts with specialized environmental judges and prosecutors.

It is difficult to assess the impact of these measures, as there are no statistical data on the application of administrative and penal sanctions for non-compliance with environmental legislation.

Voluntary compliance instruments and mechanisms

Recommendation 2.4 of the first EPR, calling on the Government to facilitate voluntary measures by private sector actors and to promote indirect environmental regulation and enforcement by non-

government actors, has been partially achieved (i.e., 2.4 (a)) through the continued development of sectoral requirements. The other parts of the recommendation (b, c, d and e), however, relating to the establishment of a web-based platform with compliance promotion and awareness-raising materials, the periodic analysis of voluntary agreements results, the promotion of the voluntary disclosure of environmental management practices by businesses and the establishment of an environmental performance ranking system for industries, have not been implemented and remain relevant.

Environmental management systems

Morocco is among the leading countries in West Africa when it comes to International Organization for Standardization (ISO) ISO 14001 environmental management system (EMS) certification. According to the ISO, by 2019, Morocco had obtained 231 ISO 14001 certifications. This figure, however, is relatively low compared with those for some European countries for the same period (e.g., 12,871 in Spain). Moreover, certified companies are mostly large companies that have the means to finance the certification process, which is not always the case for small and medium-sized enterprises (SMEs). Currently, there are no incentives or financial support available to SMEs for ISO 14001 certification.

Corporate social responsibility

The General Confederation of Moroccan Enterprises (CGEM), the country's largest network of entrepreneurs, plays an important role in promoting compliance among Moroccan industries. Within the CGEM, the Responsible Business and Citizenship Commission is active in the areas of corporate social responsibility (CSR), gender and ethics.

To improve CSR, in 2007, the CGEM created a CSR label in line with ISO 26000. The label is a tool that companies can use to assess their commitment to CSR with a view to improving progress and communicating on progress to employees, partners and the community.

Between 2007 and March 2021, 107 CGEM CSR labels were awarded to companies of all sizes and in all sectors; 40 per cent operate in industry and 60 per cent in services. CSR labels must be renewed every four years.

Since 2020, Moroccan companies that issue public offers, except for SMEs listed on the alternative

market, are obliged to publish an annual CSR report.²⁴ The report must contain a materiality assessment (identification and prioritization of CSR issues relevant for the company) and provide information on the company's CSR strategy, stakeholder relations, and environmental, social, ethical and governance practices.

Additionally, Morocco has adhered to "Responsible Care" since 1998, through the Federation of Chemistry and Para-chemistry. The international Responsible Care initiative is applied by the chemicals industry for continuous performance improvement in the areas of health, safety and the environment.

Eco-labelling

The eco-labelling process has not been developed in Morocco, probably due to the lack of specific legislation.

Other initiatives

The Department of Sustainable Development continues to promote compliance through the execution of its strategy of signing partnership agreements with private sector actors. Sector agreements contain the measures and standards needed to reduce and better control pollution in specific industries (e.g., cement, sugar).

As at 1 June 2021, Morocco did not monitor SDG indicator 12.6.1.

Environmental liability, insurance and compensation

Law No. 11-03 of 2003 on the Protection and Conservation of the Environment roughly provides for rules that set out liabilities and obligations for harm, loss or injury. It also stipulates that any natural or legal person or any regulated facility operator storing, transporting or using hydrocarbons or toxic or dangerous substances who causes bodily or material harm in the exercise of these activities is liable for damages. It also addresses environmental rehabilitation. In addition, the 2006 Law No. 28-00 on Waste Management and Disposal requires financial guarantees for the commissioning of facilities for the treatment, recovery, incineration, storage, elimination or disposal in landfills of hazardous, industrial, medical and pharmaceutical waste. The financial guarantee is intended to cover interventions in the

event of accident, occurring before or after the closing of facilities, and safety maintenance and monitoring.

The requirement of a legal regime for environmental liability was only introduced in 2014 by the Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development. It requires any natural or legal person, public or private, to remedy any harm caused to the environment. The Charter calls for the establishment of a legal regime for environmental liability that affords a high level of environmental protection. The regime should contain mechanisms for repairing and compensating for harm caused to the environment, including financial guarantees, where appropriate. The regulations required to implement the environmental liability regime have not been adopted, however.

Environmental liability is also emphasized in the 2015 Law on Quarries (Law No. 27-13) by requiring that the issuance of the proof of operations declaration for any quarry be subject to the creation of bank guarantee to be used for rehabilitation of the site if it is not done by the operator. The guarantee does not cover compensation owed by the operator to third parties for any damage caused by the quarry and its associated installations. However, the methods for calculating the amount of the guarantee, its creation and its return or use have not been established by regulation, as at 1 June 2021.

Law No. 33-13 on Mines establishes that the titleholder of a mine is liable for harm caused to third parties by mining operations. In the event of said harm, the titleholder must take the necessary measures to protect human life and the environment. The titleholder is also required to subscribe to a civil liability insurance policy. There is no provision in the Law for compensation or indemnification for harm caused to the environment.

The 2020 Law No. 49-17 on Environmental Assessment does not contain provisions on environmental liability, insurance or compensation for harm.

In general, the provisions of the current legal framework on environmental liability do not address environmental rehabilitation for harm caused by a permit holder or licensee. Rehabilitation or any form of compensation for harm to the environment in the case of irreversible harm are not provided for in the legislative armamentarium or by the implementing regulations, as at 1 June 2021. Moreover, there are no

²⁴ Moroccan Capital Markets Authority (AMMC) Circular No. 03/19, 20 February 2019, on financial transactions and information for publicly traded companies.

regulations regarding the methodology for calculating damages for harm caused to the environment.

2.5 Legal, policy and institutional framework

Legal framework

Since 2012, several laws and implementing regulations relating to environmental protection have been adopted. The most recent laws that address compliance and enforcement mechanisms and environmental liability are:

- Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development;
- Law No. 81-12 on the Coastal Zone;
- Decree No. 2-14-782 on the structure and functioning of the Environmental Police;
- Law No. 36-15 on Water;
- Law No. 49-17 on Environmental Assessment.

With the adoption of the Law on Environmental Assessment, Recommendation 2.2 of the first EPR on the improvement of EIA and authorization procedures has been partially implemented. However, its parts (a) and (b), which call for a review of the list of projects subject to EIA, a review of EIA practices at subnational level and of quality controls, were not achieved. Similarly, its parts (c) and (d) calling for the revision of the classification system for industrial installations and the introduction of integrated environmental permits were not implemented.

Other provisions relating to compliance and enforcement mechanisms are set out in various laws, decrees and orders, as follows:

- Law No. 11-03 on the Protection and Conservation of the Environment;
- Law No. 12-03 on Environmental Impact Assessment and its implementing decrees;
- Law No. 13-03 on Combating Air Pollution and its implementing decree;
- Decree No. 2-04-564 setting out the procedures for organizing and conducting public inquiries relating to projects subject to EIA;
- Law No. 28-00 on Waste Management and Disposal and its implementing decrees;
- Standards for gas emissions and liquid discharges;
- Dahir No. 97 of 25 August 1914 on the regulation of unhealthy, inconvenient or dangerous industrial facilities;
- Law No. 33-13 on Mines;
- Law No. 27-13 on Quarries;
- Law No. 142-12 on Nuclear and Radiological Safety and Security and the Creation of the

Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR).

Policy framework

As at 1 June 2021, Morocco had not established strategic objectives to ensure compliance with environmental regulations. The country does not have specific policy documents, strategies or action plans on environmental compliance monitoring.

Institutional framework

Department of Sustainable Development

The Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development coordinates the Government's policy on environmental management and sustainable development nationally. Within the Department, the Directorate of Monitoring, Environmental Assessment and Legal Affairs is in charge of the enforcement and monitoring of compliance with environmental laws and regulations. The Directorate is comprised of three divisions:

- Environmental Assessment Division;
- Environmental Monitoring Division;
- Legal Affairs Division.

The Environmental Assessment Division is responsible for the implementation of the EIA procedure, environmental audits and SEA. It was also the secretariat of the National EIA Committee, which was replaced in 2020 by the National Commission for Environmental Assessment (CNEE). This Division has two services: the Environmental Impact Assessment and Audit Service and the Strategic Environmental Assessment Service.

The Environmental Monitoring Division has two services: the Environmental Police Service, which is responsible for the environmental inspections and monitoring of projects; and the Permits and Procedures Service, which issues specific environmental permits (e.g., for waste).

Within the Legal Affairs Division, the Legal Texts Service and the Standardization Service are responsible for the preparation of laws and regulations relating to environmental protection, including environmental standards. The Division also has a Monitoring, Advisory and Litigation Service.

In addition, the LNEP supports the Directorate of Monitoring, Environmental Assessment and Legal Affairs with controls and collects samples and runs

laboratory tests on air emissions from stationary sources (flues or chimneys) and on discharges from WWTPs and industrial facilities, for example.

ONEDD has an Environmental Database Service, but the database is not fully operational and remains incomplete – for example, information on industrial emissions and discharges are missing. Regional data collection and analysis was reinforced with the creation of regional environmental and sustainable development observatories. This type of information is essential to relevant authorities involved in decision-making.

Other institutions

The Ministry of Equipment and Water, through its Directorate of Water Research and Planning, supervises the Water Police, which is in charge of monitoring compliance with the water legislation in force. Within the Ministry, the ABHs issue permits and concessions for their respective zones and monitor industrial discharges. The Ministry also oversees controls and monitoring of unhealthy, inconvenient or dangerous industrial facilities, in accordance with the law on regulated establishments. It issues operating permits for new facilities in consideration of the type of potential hazard.

The Department of Water and Forests issues CITES, forestry, hunting and fishing permits and monitors these areas. To carry out these activities, it has a corps of officers and forest rangers with a clear mandate.

The Department of Energy and Mines of the Ministry of Energy Transition and Sustainable Development has oversight of the mining sector. Through its Directorate of Mines and Hydrocarbons, it elaborates and implements mining (and hydrocarbon) sector policies and monitors mining activities, including the management of mining waste.

The General Directorate for Civil Protection within the Ministry of the Interior has a broad area of intervention that covers technological risks. In this respect, it carries out controls related to the management of chemical risks in hazardous industrial facilities, the transport of hazardous materials and the management of chemical and biological waste, among other matters.

AMSSNuR is responsible for issuing permits and compliance monitoring and enforcement in the field of the management of radioactive substances, including radioactive waste.

Environmental legislation delegates an important role in compliance monitoring and enforcement to the

Royal Gendarmerie, which has environmental brigades in every region in the country. The Royal Gendarmerie prepares police reports and imposes penalties, mostly for minor offences.

As a representative body for the private sector, the CGEM informs its members and raises their awareness on the economic and environmental issues affecting the country, thereby ensuring better compliance with environmental regulations. It has various commissions, including the Green Economy Commission, which deals with green industry and climate change, the Innovation and Industrial Development Commission, which deals with the use of renewable energy and industrial waste management, and the Responsible Business and Citizenship Commission, which deals with CSR, gender and ethics.

Coordination of the institutions in charge of national, regional and local environmental protection

The regional activities of the Department of Sustainable Development have been strengthened by the establishment of regional and provincial branches, which allow for more effective action in several areas, including environmental controls, permit procedures and EIAs. Also, the powers of local councils and authorities were extended by the 2002 Municipality Charter.

The president of a municipal council has the authority to issue permits, injunctions, bans and other forms of municipal orders. He/she is especially empowered to verify compliance with urban development plans, issue building permits and operating permits for regulated industrial facilities (category 2) and verify their compliance with regulations. However, the transfer of powers to the regional, provincial and local authorities has not been accompanied by the corresponding transfer of the necessary resources. At present, regionally and locally, the lack of capacity in terms of financial, human and technical resources prevents authorities from performing their tasks effectively.

In addition, the CRUIs, created in 2019 to replace the Regional EIA Committees, examine EIAs and issue opinions on the environmental acceptability of projects that are not national, cross-border or transregional in nature.

Photo 2.4: Al-Hassan Addakhil Dam

Photo credit: Department of Sustainable Development

2.6 Assessment, conclusions and recommendations

Assessment

The Moroccan legal framework on the environment is quite vast and covers several aspects relating to compliance and implementation mechanisms. Nevertheless, there are important shortcomings.

Since the first EPR, the permit system has undergone some changes. The new Law on Water introduced permits for wastewater reuse and the Law on the Coastal Zone introduced permits for discharging waste likely to pollute the coastline. In 2016, the then Department of the Environment started to issue waste management permits. It is worth noting that an integrated environmental permit system for large industrial installations is still lacking.

The new Law on Environmental Assessment, adopted in 2020, addressed the shortcomings of the previous Law on EIA. There continue to be deficiencies, however, particularly concerning EIA, self-monitoring and environmental auditing procedures.

The national committee that brings together industrialists and the ministerial departments to adopt specific limit values for industrial discharges lacks a clear framework and, consequently, a clear process for consultation and endorsement within a pre-established

time frame. Moreover, the processes for the drafting and publication of related implementation decrees are slow. Similarly, the determination and adoption of specific limit values for air emissions from stationary sources remains problematic. In addition, as at 1 June 2021, there were no Moroccan standards for noise and soil pollution.

With the adoption of the decree that created the Environmental Police, an environmental inspection procedure based on the PNACE was established. The implementation of the PNACE represents significant progress in the systematization of the environmental inspections. It has allowed for the harmonization of working procedures and the strengthening of multisectoral coordination nationally and regionally, particularly with the environmental brigades of the Royal Gendarmerie, the Water Police and local authorities. Besides being a mechanism for environmental compliance monitoring, the PNACE is a tool for prevention and awareness-raising among industrial operators. Notwithstanding, the risk-based planning of inspections is still difficult due to the lack of data on industrial installations, particularly for high-risk facilities. Also, the obligation to submit environmental self-monitoring reports is not explicitly required.

Moreover, Morocco does not have a regulation on liability for environmental harm, with provisions on the modalities of a financial guarantee, rehabilitation

and environmental compensation, which are of paramount importance, especially in the event of a major industrial accident with negative consequences on the environment and human health.

The recommendations of the first EPR have been only partially implemented. The adoption of new legislation, such as Joint Ministerial Order No. 2942-13 of 7 October 2013 setting the general limit values for discharges into surface water or groundwater, has partially satisfied Recommendation 2.1. Gaps remain regarding national regulatory provisions for large installations and the establishment of an environmental liability regime. Law No. 49-17 on Environmental Assessment has partially addressed Recommendation 2.2 as the EIA procedures have been completed. However, gaps remain in the specification of projects subject to EIA, EIA practices at subnational level, classification of industrial installations in line with European Union legislation and the introduction of permits for pollutant emissions. The PNACE has led to the creation of an environmental inspection system, which meets Recommendation 2.3. However, there are still no standardized self-monitoring and self-reporting requirements applicable to all sectors. The development of sectoral requirements to sustain environmental compliance and the promotion of voluntary measures by private sector and non-governmental actors partially fulfils Recommendation 2.4. Nevertheless, at the time of writing, there was no web-based platform to bring together all compliance promotion and awareness-raising materials, nor is there a periodic analysis of voluntary contracts. In addition, efforts to work in partnership and promote the voluntary disclosure of periodic reviews of voluntary contracts by companies are still insufficient.

With regard to SDG target 12.6, no data on the number of companies publishing sustainability reports were available as at 1 June 2021.

Conclusions and recommendations

Environmental permits

Currently, environmental permits for large industrial facilities (e.g., oil refineries, food industry facilities, cement industry facilities, mines) are not based on best available techniques (BAT) that would prevent or minimize emissions and discharges. An integrated environmental permit system for large industrial installations like those adopted in most industrialized countries does not exist in Morocco.

Recommendation 2.1:

The Government should consider the introduction in due course of integrated environmental permits based on best available techniques for industrial facilities with a high risk of having negative effects on the environment and the neighbouring populations.

Environmental impact assessment

The absence of implementing legislation for the new Law No. 49-17 on Environmental Assessment has prevented its implementation within a reasonable period after its adoption. There are still no provisions for the functioning and constitution of the new NCEE, including cooperation with the CRUIs. Also, as at 1 June 2021, the revised list of projects subject to EIA and the list of projects subject to an EIS have not been prepared for adoption. Moreover, the available sectoral guidelines for conducting EIAs do not cover all major sectoral projects. Another shortcoming of this law is the lack of rules for estimating GHG emissions for projects subject to EIA and for establishing measures to monitor and reduce the impact of GHG emissions on the climate. Furthermore, Law No. 49-17 does not specifically require the assessment of the “no action” alternative.

Recommendation 2.2:

The Government should prepare and submit for adoption the implementing legislation for the Law on Environmental Assessment as soon as possible, in particular those concerning:

- (a) *The establishment of the modalities for the functioning and constitution of the new National Commission for Environmental Assessment;*
- (b) *The elaboration of a new, coherent and effective list characterizing the projects that are subject to environmental impact assessment, with a view to incorporating the various types of projects that are not included on the current list, and the creation of a list of projects subject to environmental impact statements;*
- (c) *The introduction of the estimation of greenhouse gas emissions for projects and the establishment of measures to reduce the impact of these emissions on the climate; and*
- (d) *The introduction of a “no action” alternative in environmental assessments.*

The period for review of an EIA report is insufficient given the size of some large projects. For example, the 10-day deadline for sending the impact study to the committee seems very short, given that the review of an EIA may take longer because of project size. The

deadline for the committee's decision on environmental acceptability, 20 working days, also seems short. Furthermore, the lack of stricter internal quality control procedures (including ISO certification) may compromise the quality of EIAs. The lack of capacity within the ministry responsible for the environment and the EIA review boards in terms of training and human resources, nationally and regionally, can also affect the quality of EIAs.

Recommendation 2.3:

The Government should:

- (a) *Review the existing environmental impact assessment procedure and introduce more adequate time frames for key stages and stricter internal environmental impact assessment quality control procedures;*
- (b) *Strengthen capacity of relevant stakeholders to improve the quality of environmental impact assessments.*

Public participation

Regulations for conducting the public inquiry do not require that the EIA be finalized and submitted at the beginning of the inquiry. In addition, the inquiry file does not mention the consideration of the project's socioeconomic effects on communities or the need to elaborate an action plan for resettlement for projects that envisage the displacement of populations (e.g., mining and infrastructure projects). There is no indication of how the survey will be conducted or of how observations and proposals from affected communities will be collected (e.g., public meetings or written comments). Finally, the eight-day period for the preparation of the public inquiry report is insufficient.

Recommendation 2.4:

The Government should revise the public inquiry procedure to ensure that public opinion is effectively considered in environmental impact assessments and in particular:

- (a) *Require that environmental impact assessments be finalized and filed at the time of the commencement of the inquiry;*
- (b) *Effectively consider the socioeconomic effects of the project on the populations concerned;*
- (c) *Introduce modalities for the implementation of a resettlement action plan for the projects concerned;*
- (d) *Establish an adequate time frame for the preparation and submission of public inquiry reports.*

Environmental standards

The framework for the consultation and validation process for environmental standards specific to different industrial sectors is inadequate. It lacks detailed procedures and deadlines for implementation, and this slows down the process. The drafting and publishing of implementation decrees is also slow, thus thwarting their purpose. As at 1 June 2021, no standards for noise and soil pollution had been established.

Recommendation 2.5:

The Government should:

- (a) *Improve the process of setting and adopting specific industrial emission and discharge limit values with a view to establishing standard procedures to be conducted according to a predetermined schedule;*
- (b) *Ensure that noise and soil pollution standards are introduced.*

Self-monitoring

Law No. 49-17 requires the preparation of an "environmental monitoring and follow-up" programme for a project as part of the EIA. The Law does not, however, require the beneficiaries of environmental certification to send periodic reports based on implementation self-monitoring data to the environmental authority, thus rendering the submission of regular environmental reports optional. The information contained in the reports could be entered into a database that would facilitate the planning of environmental monitoring visits by the Department of Sustainable Development

Recommendation 2.6:

The Government should ensure that environmental reports containing environmental self-monitoring data for projects that have received environmental acceptability are regularly submitted to the relevant authorities.

Environmental audits

At present, the environmental audit is reserved only for the operators of industrial facilities and of other activities that are subject to EIA but do not have environmental acceptability approval (Law No. 49-17). However, the modalities for environmental audits, the procedure for obtaining environmental compliance determination and the time frame for mandatory environmental audits have not been defined. Furthermore, the Law does not require environmental audits for the renewal of environmental

permits or periodic environmental audits. Also lacking are essential audit report requirements, such as an environmental management plan that would include an environmental monitoring programme and an assessment of GHG emissions, which are needed to propose appropriate measures to mitigate negative impacts on the climate.

Recommendation 2.7:

The Government should establish provisions for environmental audit procedures, for the procedure for obtaining the environmental compliance determination and for the time frame for conducting environmental audits, by introducing:

- (a) *A requirement to conduct environmental audits for the renewal of environmental permits, as well as requiring periodic updating of the project environmental monitoring programme;*
- (b) *A requirement to have in place an environmental management plan that includes an environmental monitoring programme;*
- (c) *A requirement to assess greenhouse gas emissions and establish measures to reduce said emissions to reduce the carbon footprint of the activity in question.*

Monitoring and promoting compliance

The paucity of data on regulated installations whose activities pose a significant risk to the environment and neighbouring communities prevents the implementation of a risk-based inspection programme. There are no descriptions of individual facilities available; these should contain general and technical information, data on the compliance history of the facility and the results of environmental monitoring. This type of information is not collected and there is no national register of pollutant releases and transfers that could be used to prioritize environmental inspections. Morocco does not have specialized courts for environmental cases and there is a recognized lack of capacity for the effective implementation of environmental inspections, especially at the regional level.

With regard to voluntary compliance promotion instruments, Morocco has not created an eco-labelling system, probably due to the absence of specific legislation. In addition, there are no incentives for the implementation of ISO 14001 certification for SMEs. Certified companies are, for the most part, large

companies that have the financial means available for the certification process, whereas this is not always the case for SMEs.

Recommendation 2.8:

The Government should:

- (a) *Redouble its efforts to establish a computerized database containing descriptions of individual industrial facilities so that the information needed to plan risk-based inspections is available;*
- (b) *Establish specialized courts for environmental cases or develop the environmental capacity of regular courts;*
- (c) *Create more voluntary instruments to promote compliance, in particular through the establishment of a legal framework for eco-labelling and of aid/incentives to fund the environmental certification process (ISO 14001) for small and medium-sized enterprises;*
- (d) *Make available the resources needed to build institutional capacity for environmental inspections nationally and regionally.*

Environmental liability

The principle of environmental liability was only recently introduced into the Moroccan legal framework with the Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development. Consequently, very few laws address the issue of environmental liability for harm to the environment. Framework Law No. 99-12 provides for the establishment of a legal regime for environmental liability that offers a high level of protection for the environment. However, the legislation on the environmental liability regime has yet to be drafted.

Recommendation 2.9:

The Government should establish a legal regime for environmental liability in accordance with the Framework Law on the National Charter for the Environment and Sustainable Development and the Law on the Protection and Conservation of the Environment, which would include, in particular, procedures for the establishment of a financial guarantee for environmental rehabilitation, mechanisms for restoration and modalities for compensation for environmental harm.

Chapter 3

GREENING THE ECONOMY AND FINANCING ENVIRONMENTAL PROTECTION

3.1 Greening the system of charges and taxes

Charges and fees related to pollutants

Air pollution

There are no taxes or charges for air pollutant emissions in Morocco. Emissions of air pollutants are nevertheless limited by Law No. 13-03 on Combating Air Pollution of 2003 and controlled via a network of air quality monitoring stations (chapter 4). The limit values for these pollutants are set in Decree No. 2-09-286 of 8 December 2009 (chapter 8) and are being updated.

The Law also stipulates that investments by enterprises designed to reduce or prevent pollution can benefit from financial incentives, including tax breaks and partial or complete exoneration of customs duties for the purchase of cleaner technologies in line with conditions established in the annual government finance laws. Finally, it stipulates the application of sanctions and pecuniary fines in the case of non-compliance with established air pollution regulations. For example, a person responsible for air pollution who voluntarily neglects to inform the authorities, even if the origin is accidental, is liable to a fine of 1,000–20,000 dirhams (approximately US\$105–US\$2,105). In the case of a repeat offence, the maximum penalty is doubled. In addition, the offender may be sentenced to imprisonment, ranging from one day to one month. However, as at December 2021, these sanctions and fines have not been applied.

Water pollution

Discharges of pollutants into water bodies (surface or underground) are subject to an administrative authorization and require the payment of a tax, according to the 2016 Law No. 36-15 on Water. The authorization is to be issued by the corresponding water basin agency (ABH), which also collects the corresponding tax (Decree No. 2-04-553 of 24 January 2005). This only concerns discharges into inland water sources and not into the

seawater beyond the coastline, which receives the large bulk of wastewater discharges.

Decree No. 2-04-553 distinguishes between domestic and industrial wastewater. Domestic wastewater includes wastewater from households, hotels, public administration buildings and hospitals, as well as wastewater from laboratories, plants and workshops with water consumption below 10 m³/day and of which the operator in charge of the sewerage service considers that there is no high pollution risk. All the other sources of wastewater are considered industrial ones.

For urban domestic wastewater, the fee amounts to the total water consumption in m³ multiplied by 0.30 dirhams. The value of the fee has been the same since 2012 (2006 Joint Ministerial Order No. 1180-06). Because the wastewater fee has been at the same level since 2012, inflation has reduced its effectiveness. To have the same effect as in 2012, the fee multiplier should be 0.5 dirhams.²⁵ Rural domestic wastewater discharges are subject to a flat fee of 500 dirhams per year.

The industrial wastewater fee depends on the quantity of “pollution units” (PUs) in the discharged water. Each PU is the weighted sum (expressed in kg/year) of biochemical oxygen demand during five days (BOD5), chemical oxygen demand (COD), total suspended solids and a number of heavy metals, such as zinc, chrome, nickel, copper, arsenic, lead, cadmium and mercury (2006 Joint Ministerial Order No. 1180-06): $PU = 0.6 * MO + 0.15 * MES + 6.5 * ML$, where PU = number of pollution units; $MO = (2 * BOD5 + COD) / 3$; MES = total suspended solids; ML = sum of quantities of specified heavy metals). Besides the number of PUs, the total bill for industrial wastewater discharges is also influenced by a coefficient (E) that takes into account the performance of existing purification devices in terms of pollution reduction and the removal of pollutants (as a percentage) before the treated water is channelled to surface water or groundwater bodies. The total fee (F) for wastewater discharges is thus: $F = PU * CR * E$, where CR is the pollution charge rate. In the case of

²⁵ The CPI for Morocco was 1.287 in 2012 and 0.706 in 2020 (World Bank).

absence of a wastewater treatment plant (WWTP), the total charge due is simply: $F = PU * CR$.

Since 2016, this rate has been 0.70 dirhams (up from 0.30 in 2013), i.e., US\$0.08, which is quite low but in line with tariffs in other countries of the region. By comparison, in Egypt, water and wastewater tariffs are around US\$0.08/m³ and cover only 25 per cent of the cost of water supply services and 10 per cent of the costs of providing sewerage services.²⁶

According to the Court of Auditors,²⁷ the total amount of water pollution charges collected by the ABHs in 2017 was 2.87 million dirhams (around US\$0.33 million), which corresponds to around 1.5 per cent of all fees they received.

Waste management

Waste generation and disposal is governed by the 2006 Law No. 28-00 on Waste Management and Disposal, later modified by Law No. 23-12 of 2 August 2012. The Law stipulates that municipal waste management services are subject to a user charge, which is to be determined by each municipal council. However, a specific fee for waste services has not been introduced to date. This was already the case at the time of the first EPR.

Instead, the 2007 Law No. 47-06 on Local Government Taxation established a municipal services tax, which uses as its tax base the imputed rental value of the buildings occupied by households. In urban municipalities, the tax rate is 10.5 per cent of the imputed rental value of the building, while in rural

municipalities the rate is reduced to 6.5 per cent of the imputed rental value. This tax covers not only waste collection and management but also other public services such as public lighting and street cleaning. As such, 95 per cent of the tax proceeds are allocated to the municipality's budget and 5 per cent to the corresponding regional budget.

Ecotax on plastic

The Law on Finances No. 115-12 for Budget 2013 introduced an environmental tax on imports, applicable on plastics and articles falling within chapter 39 of the World Customs Organization (WCO) Harmonized System (HS).²⁸ The initial rate of this ecotax was set at 1.5 per cent ad valorem but was revised to 1 per cent in 2016 while modifying the list of products subject to this tax by introducing 222 products which are not included in the HS Chapter 39 and eliminating 78 products from the list of HS Chapter 39. The tax proceeds are allocated to the National Environmental Protection and Sustainable Development Fund (FNEDD) and used to promote the country's waste management and recycling sector. The tax amounts have decreased by 16 per cent since 2016 (table 3.1). This decrease could be linked to the adoption in 2015 of Law No. 77-15, also known as the Zero Mika Law banning the use, production or import of plastic bags throughout the country. However, as at June 2021, no study assessing the impact of the ecotax has been carried out. Overall, environmental taxes in Morocco are low. Table 3.2 shows OECD data and compares environmental taxes in Morocco with those of selected countries from the Middle East and North Africa (MENA) region.

Table 3.1: Proceeds from the ecotax on plastic, 2014–2020, million dirhams

	2014	2015	2016	2017	2018	2019	2020
Proceeds	200.04	209.41	171.37	181.65	178.16	180.73	168.07

Source: Ministry of Energy Transition and Sustainable Development, 2021.

Table 3.2: Environmentally related tax revenue for selected countries, 2018

Countries	Percentage of GDP	Percentage of total tax revenue	US\$ per capita
Egypt	0.91	6.12	112.90
France	2.32	5.08	1,033.42
Germany	1.77	4.57	881.70
Morocco	0.46	1.65	34.24
Tunisia	1.63	5.06	169.76

Source: OECD, Environmental taxation: www.oecd.org/env/tools-evaluation/environmentaltaxation.htm, accessed 2021.

Note: 2019 for France and Germany.

²⁶ <https://ppiaf.org/documents/5598/download>.

²⁷ www.courdescomptes.ma/upload/ftp/documents/13_Gestion%20du%20domaine%20public%20hydraulique.pdf.

²⁸ The Harmonized Commodity Description and Coding System, generally referred to as the “Harmonized System” or “HS”, is a multipurpose international product nomenclature developed by the WCO. It comprises more than 5,000 commodity groups, each identified by a six-digit code, arranged in a legal and logical structure.

*Taxes and excise duties*Excise duties

Morocco implements excise duties or Internal Consumption Tax (TIC) on fossil fuel imports, which are collected by the Customs and Excise Administration. In 2019, the TIC on energy products amounted to 16.62 million dirhams (US\$1.73 million), which represents around 7.5 per cent of total fiscal revenues for that year.²⁹

Fossil fuels used for electricity generation (coal, natural gas) are exempt from the TIC, while the rates on coal and coke used for industrial production are lower than those for heavy fuel oil (table 3.3). A “diesel differential” (difference in the TIC applied to diesel versus petrol) exists. The excise duty for diesel is about 36 per cent lower than that for leaded and unleaded petrol. According to the 2019 study on environmental fiscal reform in Morocco,³⁰ the foregone TIC revenues from this exemption were estimated at 525 million dirhams for 2014.³¹

Table 3.3: Excise duties on energy products

Product	Unit	Dirhams	Euros
Jet fuels	Hectolitre	33.5	3.12
Diesel	Hectolitre	242.2	22.52
Kerosene	Hectolitre	44	4.09
Leaded and unleaded petrol	Hectolitre	376.4	35.01
Natural gas	1 000 m ³	exempt	-
Heavy fuel oil, coal and coke used for electricity production	ton	exempt	
Heavy fuel oil for other usage	ton	182.4	16.96
Coal for other usage	ton	64.8	6.03
Coke for other usage	ton	83.5	7.77
Premium fuel	1 000 m ³	341.4	31.75

Source: Customs and Excise Administration, 2021.

Note: 1 dirham = €0,093.

Photo 3.1: “Green” transportation, Casablanca

Photo credit: Bouchra Taouil

²⁹ General Treasury of the Kingdom, 2020.

³⁰ <https://openknowledge.worldbank.org/bitstream/handle/10986/34030/Environmental-Fiscal-Reform-in-Morocco-Options-and-Pathways.pdf?sequence=4&isAllowed=y>.

³¹ This number is most certainly higher since the coal power plants of Jerada and Safi started producing in 2017.

Land tax

In urban areas, landowners are subject to land tax. Law No. 47-06 sets the tax rates between 4 and 20 dirhams per m² in high-rise building areas and between 2 and 12 dirhams per m² in residential areas.

Property tax and municipal services tax

Legal entities and natural persons who own real estate buildings (residential and non-residential) are required to pay an annual property tax. Exceptions include estates belonging to the State and the royal family, NGOs, foreign government representations and religious authorities. Moreover, new buildings used as a main residence benefit from a tax exemption of five years. The tax rate, established by Law No. 47-06, is determined based on the imputed rental value of the property (table 3.4).

Table 3.4: Property tax rates

Annual rental value (dirhams)	Tax rate (%)	Deductible amount
0–5 000	Exempt from tax	-
5 001–20 000	10	500
20 001–40 000	20	2 500
> 40 000	30	6 500

The revenues from the property tax are split between the budget of the municipality where the property is located (90 per cent) and the State budget (10 per cent).

The Municipal Services Tax is also established by Law No. 47-06. It is paid by owners of properties also subject to the property tax, as follows: 10.50 per cent of the property rental value, for properties located within urban municipalities, summer and winter resorts, and thermal stations; 6.50 per cent of the

property rental value for assets located in the suburbs of urban municipalities.

Annual tax on motor vehicles

All motor vehicles are subject to an annual tax established in 1953. Exceptions to this vehicle tax include public transportation vehicles, state vehicles, vehicles weighing more than 3 tons, taxis, agricultural engines, diplomatic vehicles, vehicles belonging to the Moroccan Red Crescent Organization, certain public works machinery and national mutual aid vehicles, motorbikes and historic collection vehicles. The amounts collected are disbursed directly to the State budget. They are expected to be used to improve road infrastructure.

Since 2019, electric and hybrid cars are exempted from the tax. Other measures to encourage the population to buy clean vehicles include a project to equip Moroccan highways with charging stations and a reduction in customs and registration fees for clean vehicles.

For vehicles weighing less than 3 tons, the tax rate depends on the fuel used – with diesel vehicles having a higher rate than others – and the fiscal horsepower (fhp) of the vehicle. The rates were last revised in 2010 and are presented in table 3.5.

For vehicles weighing more than 3 tons – as well as consisting of a tractor and trailer or semi-trailer – the rates applied do not depend on the fuel type of the vehicle and only vary with the weight (table 3.6).

In 2019, the revenues from the annual tax on motor vehicles amounted to 3,402 million dirhams (US\$353.75 million), with around 3.5 million vehicles subject to the tax.

Table 3.5: Annual tax on motor vehicles, dirhams

Fuel type	< 8 fhp	8–10 fhp	11–14 fhp	>= 15 fhp
Petrol, electric and hybrid	350	650	3 000	8 000
Diesel	700	1 500	6 000	20 000

Source: General Tax Code, 2021.

Note: fhp = fiscal horsepower.

Table 3.6: Annual tax for vehicles weighting more than 3 tons, dirhams

Weight	3 000–4 999	5 000–8 999	9 000–14 999	15 000–19 000	20 000–32 000	33 000–39 999	> 40 000
Tax	800	1 350	2 750	4 500	7 300	7 500	11 000

Source: General Tax Code, 2021.

Vehicle registration tax

Vehicles subject to the annual tax on motor vehicles are also subject to a registration tax when they get their first licence plate in Morocco. The total registration tax has two components: the first is a “fixed” tax that depends on the fiscal horsepower of the vehicle, much like the annual tax; the second is a “proportional” tax based on the vehicle’s value, which depends on the make, model and year in which the vehicle first started circulating.³² More specifically, the tax varies according to the vehicle’s fhp, as follows:

- < 8 hp: 2,500 dirhams;
- 8–10 hp: 4,500 dirhams;
- 11–14 hp: 10,000 dirhams;
- ≥ 15 hp: 20,000 dirhams.

The vehicle’s value (excluding VAT) affects the tax rate as follows:

- 400,000–600,000 dirhams: 5 per cent;
- 600,001–800,000 dirhams: 10 per cent;
- 800,001–1,000,000 dirhams: 15 per cent;
- > 1,000,000 dirhams: 20 per cent.

Electric and hybrid vehicles are exempt from this registration tax.

Other vehicle taxes

Drivers and vehicle owners must also pay a number of other taxes, including a one-off 300-dirham tax on drivers’ licences, and another tax due each time the vehicle passes the mandatory periodical technical inspection (Law No. 47-06). The latter varies between 30 and 100 dirhams depending on the vehicle’s fhp. No assessment of compliance with environmental pollution standards was carried out. The revenues of these two taxes are allocated to the budget of the corresponding province.

Coach tax

Morocco implements a tax on taxis and public transport vehicles (TTPVs). This tax is established in Law No. 47-06 and the tax rate is also determined by the same Law. The tax is to be paid every quarter:

- Second category taxis: 80–200 dirhams;

- First category taxis: 120–300 dirhams;
- Buses with fewer than seven seats: 150–400 dirhams;
- Category C buses: 300–800 dirhams;
- Category B buses: 500–1,400 dirhams;
- Category A buses: 800–2,000 dirhams.

The revenues of the tax are allocated to the budget of the corresponding municipality.

Tariffs for utility services

Electricity tariffs

The electricity sector in Morocco has been reformed since the early 1990s and is today partially liberalized, for both generation and distribution.

The share of power generation by ONEE, has decreased significantly, from 90 per cent in 1991 to about 23 per cent in 2019. Other producers include private companies,³³ which are linked to ONEE by power purchase agreements, and auto-producers that produce their own electricity and only sell ONEE any surplus production they might have. Electricity transmission is the sole responsibility of ONEE, which owns the transmission network and is in charge of the overall supply and demand equilibrium.

As for distribution, in urban areas it is mainly ensured by municipal (public) as well as private operators. More precisely, there are seven public municipal electricity operators in the cities of Marrakesh, Fès, Meknès, Kenitra, El Jadida, Safi and Larache. The private concessions are authorized by Law No. 54-05 to manage the water, sanitation and electricity services in the cities of Casablanca, Rabat and Salé, Tangier and Tétouan. ONEE is in charge of electricity distribution in rural areas as well as in a small number of urban centres.³⁴

Since the first EPR, the country has created an autonomous regulatory agency for the electricity sector, the National Authority for Electricity Regulation (ANRE), established on 19 June 2016 via Law No. 48-15. ANRE is responsible for setting electricity tariffs. The latest tariffs update was set by Ministerial Order No. 2451-14 of 21 July 2014. Tariffs for all groups of end users are typically progressive block tariffs. For industry, there are, inter alia, dual-rate tariffs that depend on the time of the day (peak

³² General Tax Code, 2021.

³³ There are currently six such private companies: Jorf Lasfar Energy Company (JLEC-2020 MW), the Compagnie Eolienne du Détroit (CED-54MW), the Société Energie Electrique de Tahaddart (EET-384 MW), the Tarfaya Energy Company (300 MW), the SAFI Energy Company (SAFIEC-1386 MW) and MASEN.

³⁴ At the end of 2019, ONEE counted almost 6.5 million clients, most of which were rural households (www.one.org.ma).

load time or off peak), voltage level and annual hours of consumption. In agriculture, there is a so-called “green tariff” that distinguishes between summer and winter time. Household tariffs depend only on monthly consumption (table 3.7).

Table 3.7: Household electricity tariffs, dirhams

Monthly consumption KWh	Tariff
0–100	0.9010
101–150	1.0732
151–200	1.0732
201–300	1.1676
301–500	1.3817
> 500	1.5958

Source: ONEE, 2021.

Note: These tariffs include a 14 per cent VAT.

A special tariff (the Nour system) allows the purchase of electricity using prepaid, rechargeable electronic cards with a minimum purchasing value of 20 dirhams. The system, which initially was only applied to clients of ONEE in rural areas, has been progressively extended to other parts of the country (notably the suburbs of large towns) since March 2009. According to ONEE, this allows clients to align their electricity purchases with the development of their revenues and actual needs. There is a uniform tariff per kWh which, however, differs among user groups, such as households and commercial enterprises.

The tariffs applied to the other operators that buy their electricity from ONEE depend on the season (summer or winter) and time of day (peak, high-demand and low-demand hours), as well as the voltage (very high, high or medium) (table 3.8).

In 2013, Morocco’s electricity tariffs were among the highest in the MENA region but remained slightly below the necessary cost-recovery rates.³⁵

Table 3.8: Electricity tariffs for industrial operators, dirhams/kV/year

Voltage	Fixed price	Peak hours	High-demand hours	Low-demand hours
Very high: 225 kV	186.98	1.2840	0.8628	0.5722
High: 60 kV	186.98	1.2885	0.8658	0.5729
Medium: 22 kV and 5.5 kV	186.98	1.3122	0.8818	0.5743

Source: Ministerial Order No. 2451-14 of 21 July 2014.

Note: Prices established on 1 January 2017, including 14 per cent VAT.

Tariffs for water supply and sewerage services

According to the Organic Law No. 113-14, municipalities are responsible for constructing and managing the infrastructure necessary to supply “proximity” public services such as drinking water supply and sewerage. The municipalities can delegate these services to operators. Drinking water supply is carried out through four service delivery models:

- Delegation to ONEE (services in about 600 small and medium-sized cities, representing around 30 per cent of the population);
- Autonomous agencies in 12 large cities, whereby the Government has a contractual agreement with ONEE and 12 regional collectives (33 per cent of the population);
- Delegation to private sector operators in four large cities (Casablanca, Rabat and Salé, Tangier and Tétouan) through concession-like arrangements (37 per cent of the population);
- Direct management by a municipality of its own services (less than 1 per cent of the population).

Water supply and sewerage tariffs are set by Ministerial Order No. 2682-14 of 21 July 2014.

ONEE charges tariffs for the supply of bulk water to the private operators and the agencies. These tariffs are reviewed by the Government together with the tariffs for the agencies and ONEE’s retail water and sewerage tariffs. Bulk water tariffs differ from one city to another considering production costs. They include a 5 per cent special tax on bulk water sales in order to finance the rural water supply programme (PAGER). Following Ministerial Order No. 2682-14, these tariffs have increased by around 16 per cent from 2014 to 2017 and have remained stable since. Table 3.9 presents the wholesale tariffs.

³⁵ <https://openknowledge.worldbank.org/bitstream/handle/10986/29228/122842-BRI-PUBLIC-LW83-LJ-fin-OKR.pdf?sequence=1&isAllowed=y>.

Retail tariffs vary not only by location but also by type of client. Indeed, the Decree distinguishes four types of water use: domestic, preferential (public baths and standpipes in rural areas), industrial and use by hotels. The final user price paid is composed of a fixed monthly fee – 6 dirhams for households and 10 dirhams for other users – and a variable fee based on actual consumption. For households, the variable

consumption fee is further divided into five tariff blocks depending on total monthly consumption (0–6 m³; 6–12 m³; 12–20 m³; 20–35 m³; and more than 35 m³). For other users, a uniform volumetric tariff per m³ of water is applied. Retail water tariffs for domestic use and for non-domestic use remain the highest in the Oujda municipality (tables 3.10 and 3.11).

Table 3.9: Wholesale water tariffs, dirhams

Municipality	2014	2015	2016	2017
El Jadida-Azemmour and other centres using water from Daourat and Sidi Daoui dams	4.45	4.72	5.00	5.30
Casablanca-Mohammedia-Rabat-Salé-Témara-Skhirat-Bouknadel-Oued Nfifikh-Bni Yakhlef-Aïn Harrouda	4.60	4.88	5.17	5.48
Kenitra-Mehdia	4.39	4.65	4.93	5.23
Safi-Oualidia-Essaouira	4.20	4.45	4.72	5.00
Asilah	3.78	4.01	4.25	4.50
Al Hoceima-Agadir-Ait Melloul-Inezgane-Ouled Téima	4.07	4.31	4.57	4.85
Marrakesh	3.2	3.39	3.6	3.81
Tangier	3.03	3.21	3.4	3.61
Tétouan-Fnidaq-M'diq	3.02	3.20	3.39	3.60
Larache-Ksar El Kébir	3.14	3.33	3.53	3.74
Settat-Tamanar	2.32	2.46	2.61	2.76
Fès-Sefrou-Bhalil	3.23	3.42	3.63	3.85
Beni Mellal-Kasba Tadla-Fqih Ben Salah	2.53	2.68	2.84	3.01
Khouribga	4.52	4.79	5.08	5.38
Oujda	3.73	3.95	4.19	4.44
Meknès	2.55	2.71	2.87	3.04
Meknès-Ribaa and Bittit sources	1.56	1.65	1.75	1.85
Taza	3.25	3.45	3.65	3.87

Source: Ministerial Order No. 2682–14 of 21 July 2014.

Table 3.10: Retail water tariffs for domestic use - VAT excluded, dirhams/m³

Municipality	Block 1	Block 2	Block 3	Block 4	Block 5
Kenitra-Mehdia	2.32	5.25	5.25	6.59	6.64
Other centres managed by Kenitra board	2.37	7.39	7.39	10.98	11.03
Larache and Ksar-El Kébir	1.74	5.31	5.31	6.06	6.11
Meknès	1.71	5.12	5.12	5.88	5.95
Fès-Sefrou-Bhalil	1.95	7.07	7.07	8.79	8.84
Oujda	3.81	10.11	10.11	14.72	14.77
Beni Mellal-Kasbat Tadla-F'quih - Ben Salah	2.61	6.51	6.51	10.14	10.19
Marrakesh	1.70	6.37	6.37	9.36	9.41
Essaouira	2.65	6.44	6.44	11.17	11.23
Oualidia	2.52	6.65	6.65	6.65	10.79
Bir Jdid-Sidi Bennour-Zemamra	2.47	6.15	6.15	10.07	10.13
Azemmour-Ouled Frej	2.47	7.02	7.02	11.53	11.59
El Jadida	3.09	7.78	7.78	11.86	11.91
Al Hoceima	2.71	7.32	7.32	10.96	11.02
Agadir	2.95	7.77	7.77	9.58	9.63
Taza	2.15	6.00	6.00	8.92	8.97
Settat	2.63	6.86	6.86	7.53	7.58
Other centres managed by Settat board	2.37	7.39	7.39	10.98	11.03
Safi	3.32	7.88	7.88	13.12	13.17
Khouribga	3.07	7.4	7.4	11.22	11.27
Chefchaouen	1.79	4.71	4.71	6.61	6.66
Small centres managed by ONEE	2.37	7.39	7.39	10.98	11.03

Source: ONEE; Ministerial Order No. 2682-14 of 21 July 2014.

Table 3.11: Retail water tariffs for non-domestic use - VAT excluded, dirhams/m³

Municipality	Administration	Industry	Public baths	Hotels
Kenitra-Mehdia	6.64	5.10	4.66	6.08
Other centres managed by Kenitra board	11.03	7.52	6.98	6.98
Larache and Ksar-El Kébir	6.11	3.91	3.73	5.00
Meknès	5.95	3.00	3.07	5.11
Fès-Sefrou-Bhalil	8.84	5.86	5.56	7.97
Oujda	14.77	10.21	10.59	12.73
Beni Mellal-Kasbat Tadla-F'quih-Ben Salah	10.19	7.03	7.37	8.95
Marrakesh	9.41	5.99	5.64	8.38
Essaouira	11.23	6.65	6.21	6.21
Oualidia	10.79	6.21	5.68	8.38
Bir Jdid-Sidi Bennour-Zemamra	10.13	7.01	6.35	8.20
Azemmour-Ouled Frej	11.59	7.46	6.79	9.21
El Jadida	11.91	7.19	6.51	9.41
Al Hoceima	11.02	6.49	6.05	6.05
Agadir	9.63	6.49	6.03	8.72
Taza	8.97	6.11	6.34	7.97
Settat	7.58	6.07	5.81	7.19
Other centres managed by Settat board	11.03	7.52	6.98	6.98
Safi	13.17	8.17	7.46	11.36
Khouribga	11.27	7.48	6.87	6.87
Chefchaouen	6.66	2.92	4.61	4.61
Small centres managed by ONEE	11.03	7.52	6.98	6.98

Source: ONEE; Ministerial Order No. 2682-14 of 21 July 2014.

Sewerage tariffs are also established in Ministerial Order No. 2682-14 of 21 July 2014. Similarly to water tariffs, they are composed of a fixed fee and a variable fee based on usage (table 3.12). They further differ according to location – municipalities are divided into four groups.³⁶ While the fixed part of the tariff has remained the same since 2014, there has been a regular increase of the variable component of the tariff from 2014 to 2017 (16 per cent over the whole period), much the same as for water supply tariffs.

According to a 2017 World Bank report,³⁷ overall, water and sewerage tariffs are set so as to ensure cost recovery for ONEE, and the other operators involved in these services. The lower water and sewerage tariff blocks paid by households are considered “social” tariffs and are below recovery cost. There is thus some degree of cross-subsidization. The application of tariffs does not include incentives for water conservation.

According to High Commission for Planning (HCP) data on SDG indicator 1.4.1, in 2017, only 30.3 per

cent of households had access to all basic services, which include tap drinking water, electricity, in-house toilet, connection to a public sewerage network and the disposal of household garbage in public neighbourhood containers or via a garbage collection service.³⁸

According to the UNSTAT database, in 2020, 90 per cent of the population (national average) had access to basic drinking water services (77 per cent in rural areas and 98 per cent in urban areas), and 87 per cent (national average) had access to basic sanitation services (71 per cent in rural areas and 96 per cent in urban areas). In 2020, ONEE reports that 100 per cent of urban areas had access to drinking water. For the same year, it reports that 97.8 per cent of the rural population had access, compared with 94 per cent in 2013.³⁹

Regarding sanitation, the Ministry of Finance, in its Report on the Treasury Special Accounts for the end

³⁶ Group I includes Khenifra and Mouha Ou Hammou Zayani, Mrirt, Azilal, Berkane and Sidi Slimane, Cheraa and Zegzel, Taourirt, Tafoughalt, Aïn Taoujdat; Group II includes Outat El Haj, Sid L'Mokhtar, Rissani, Bouarfa, El Aroui, Zaïo, Kalaat M'Gouna, Ben Ahmed, El Gara, Dar El Gueddari, Guelmim, Errachidia, Essaouira, Azrou, Sidi Slimane, Tiznit, Ouled Teima, Biougra, Ouarzazate, Tarmigt; Group III includes Nador, Bejaad, Sidi Talbi, El Aioune Sidi Mellouk, Dakhla, Berrechid, Tafraout, Deb dou, Laâyoune, Oued Zem, Akka, Ben Taieb Laâyoune Marsa, Ben Slimane, Tata, Al Hoceima, Boujdour, Bouznika, Foum El Hisen, Imzouren, Tan Tan, Khemisset, Foum Zguid, Targuist, Tarfaya, Tiflet, Ouled Berhil, Beni Bouayache, Sidi Yahia Zair, Dar Chaoui, Drarga, Aïn Aouda; and Group IV includes all other municipalities.

³⁷ <https://documents1.worldbank.org/curated/en/488091516133312338/pdf/summary-report.pdf>.

³⁸ This indicator signifies the effective connection rate of households to basic services, while the access rates are: 98 per cent for drinking water; 96.9 per cent for sanitation; and 98.6 per cent for electricity.

³⁹ www.onep.ma/.

of 2020,⁴⁰ reports an urban connection rate of 80 per cent, a wastewater treatment rate of 56 per cent and 158 WWTPs. The Government aims to achieve this 3-fold goal by 2024: a connection rate of 84 per cent, a wastewater treatment rate of 64 per cent and 215 functioning WWTPs.

Fees and taxes for use of natural resources

Water abstraction fees

Public and private entities extracting water must pay water abstraction fees to the ABHs. The fees depend on the water use and were first introduced by the Law on Water (No. 10-95) of 1995 (table 3.13). The abstraction fee level is low, not allowing the RBAs to cover their administrative costs nor to finance the investments that service providers are required to do. The inflation rate was 46.67 per cent in the period from 1995 to 2020 and, since the fees have not been adjusted since their introduction, the value of the already low fees has been further eroded.

Mineral water tax

Law No. 47-06 on Local Government Taxation establishes a mineral water tax, payable by all firms exploiting mineral water sources. The tax rate is set at 0.10 dirham per litre and the tax proceeds go to the budget of the relevant municipality.

Quarries extraction tax

The quarries extraction tax is applied on the extraction of different types of rock, marble and sand. The tax rate depends on the substance extracted and varies from 3 dirhams to 30 dirhams per m³. The rates have not been updated since 2007. Inflation increased by 18.3 per cent between 2007 and 2020. The tax proceeds are shared between the municipality where the extraction occurs (90 per cent) and the corresponding region (10 per cent).

Since the first EPR, the legislation regulating the exploitation of quarries was updated with the adoption of Law No. 27-13 on 9 June 2015, which imposes more stringent rules regarding EIA, damage liability and responsibility for the financing of rehabilitation at the end of exploitation activities.

Table 3.12: Sewerage tariffs – VAT excluded, dirhams

User	Group I	Group II	Group III	Group IV
Households				
Fixed fee	36.00	36.00	36.00	36.00
Proportional fee				
0–6 m ³	0.56	0.65	0.75	0.75
6–20 m ³	3.11	3.31	3.51	3.51
> 20 m ³	3.96	4.33	4.71	4.71
Administration, public firms and local government entities				
Fixed fee	72.00	72.00	72.00	72.00
Proportional fee	3.11	3.66	4.21	4.21
Industry and public baths				
Fixed fee	144	144	144	144
Proportional fee	3.96	4.33	4.71	4.71

Source: ONEE; Ministerial Order No. 2682-14 of 21 July 2014.

Table 3.13: Water abstraction fees, dirhams/m³

Use	Legal instrument	Fee
Hydropower production	Joint Ministerial Order No. 520-98 (12 March 1998)	0.02
Irrigation	Joint Ministerial Order No. 548-98 (21 August 1998)	0.02
Drinking water	Joint Ministerial Order No. 2283-03 (24 December 2003)	0.04
Water for industrial purposes	Joint Ministerial Order No. 2565-05 (14 November 2005)	0.02

⁴⁰ www.finances.gov.ma/Publication/db/2021/06-%20Rapport%20CST_Fr.pdf.

Tax on mining products

The 2007 Law No. 47-06 establishes a tax on the extraction of mineral products of 1–3 dirhams per ton of minerals. No report is available on the amounts collected and their use.

Tax on forest products

The 2007 Law No. 47-06 establishes a tax to be paid over the value (excluding VAT) of forest products. The tax rate is 10 per cent.

Tax on hunting permits

According to the General Tax Code, there is a 300-dirham tax per year of validity on hunting permits, of which 100 dirhams are allocated to the Continental Hunting and Fishing Fund. The remaining 200 dirhams are allocated to the budget of the region concerned.

Feed-in tariffs for renewable energy sources

There are no feed-in tariffs for renewable energy production in Morocco. Nevertheless, the country has declared the intention to reach over 52 per cent of installed electricity production capacity from renewable sources by 2030,⁴¹ which is an ambitious target. Algeria, for example, has set a target of 27 per cent by 2030 while the United Arab Emirates set its target at 24 per cent by 2021.⁴²

The maximum installed capacity for dams was increased from 12 MW in 2011 to 30 MW in 2016. Since 2016, renewable energy producers also have access to the low voltage network (on top of medium, high and very high) and are able to sell excess energy produced to ONEE.

A new law project (concerning proposed Law No. 40-19) is published on the website of the SGG for comments and suggestions. If adopted, it would further modify the rules regarding the renewable energy market. In particular, the Law would allow ONEE to launch calls for renewable energy projects – which are exclusively at the initiative of private operators for the moment – and would give ANRE the responsibility of setting the tariffs at which excessive renewable energy can be sold to ONEE.⁴³

As at June 2021, no cap-and-trade mechanism is implemented in the country.

3.2 Greening the subsidies system

According to the Bank of Morocco Annual Report 2019, there are several green subsidies implemented in the country. These are mainly subsidies for pollution reduction and environmental protection activities, which are financed through the FNEDD and the FODEP.

National Environmental Protection and Sustainable Development Fund

The FNEDD was created following the adoption of Framework Law No. 99-12 of 6 March 2014. Its main objective is to contribute to environmental protection and finance sustainable development programmes.

It provides funding through the voluntary mechanism for the reduction of water pollution from industrial sources (MVDIH). This mechanism is jointly funded by the Government and the European Union, with a budget of 105 million dirhams. The implementation convention was signed in December 2011 between the Ministry of Economy and Finance, the then State Secretariat for Water and the then Department of the Environment of the then Ministry of Energy, Mines and the Environment. The subsidies are distributed to industrial firms by the respective ABH. Since 2011, 29 projects have been subsidized, of the 30 initially planned.

The FNEDD also supports better environmental practices in the handicrafts sector, in particular through the replacement of traditional stoves by modern gas ovens. To date, there have been two funding phases. The first, with a budget of around 3.9 million dirhams, was implemented in partnership with the Partnership for Progress Agency (APP). It funded the acquisition of 20 ovens for potters in the regions of Fès and Marrakesh. The second phase, with a budget of 7.32 million dirhams, focused on the acquisition of ovens for craftspeople in the provinces of Zagora, Salé and El Jadida. In total, the programme is expected to finance 100 new ovens.

Another important component of the FNEDD focuses on the collection, treatment and recovery of waste from the olive sector (olive pomace). The main targeted projects are:

- The implementation of crushing systems generating less olive oil waste (crushing lines with the 2-phase system, equipment for converting

⁴¹ www.environnement.gov.ma/images/Climat/7.BUR2-min.pdf.

⁴² www.unep.org/resources/publication/environmental-challenges-middle-east-and-north-africa-region-paper.

⁴³ Currently, excessive energy tariffs are set in a one-to-one negotiation between ONEE and the private energy producer.

from the three-phase system to the irreversible two-phase system).

- The establishment of collective basins for the treatment of vegetable waters.
- The establishment of processing and recovery units for olive pomace.
- The implementation of vegetable water spreading projects.
- The acquisition of tank trucks adapted for the collection and transport of vegetable waters.

FNEDD funds are also used to finance the PNDM and the PNVD. In this context, the FNEDD financed the following actions:

- Awareness-raising actions on waste sorting and recovery (7.2 million dirhams) (2016);
- Plastic bag collection campaigns (83 million dirhams) (2016–2017);
- Setting up sorting centres at controlled landfills for the benefit of 14 local authorities and an association for the recovery of agricultural plastic (277.1 million dirhams) (2018–2019).

Fund for Industrial Pollution

FODEP was created in 1998 in partnership with the Kreditanstalt für Wiederaufbau (German Agency for Financial Cooperation, KfW) and aims to assist firms to finance pollution reduction and resource conservation projects. KfW has provided €24 million (270 million dirhams) in three instalments: FODEP 1 (€9 million), FODEP 2 (€10 million) and FODEP 3 (€5 million).

FODEP, managed by the Ministry of Energy Transition and Sustainable Development, provides subsidies to firms of up to 40 per cent of a project's cost. These subsidies are then coupled with bank loans and firms' own funds (a minimum of 20 per cent). Two types of projects are funded: (i) projects integrated to industrial production processes aiming to reduce pollution emissions and streamline resource consumption (water and energy mainly), and (ii) (downstream) projects to reduce pollution through the establishment of treatment facilities for liquid and gaseous discharges and solid waste. The projects can be undertaken by a single firm – in which case, the total subsidy is capped at 15 million dirhams – or a group of several firms, for a total subsidy of 30 million dirhams.

Since 2012, 22 projects have been funded through FODEP: in the food processing industry (8), chemical

sector (3), mechanics and metalworking industry (3) and textiles and leather industry (8).

Environmentally harmful and friendly subsidies, including tax relief and direct payments

According to the 2019 study on Environmental Fiscal Reform in Morocco: Options and Pathways, between 2013 and 2015, Morocco phased out direct subsidies on all imported fuels. Indeed, in early 2014, the Government decided to withdraw subsidies for most petroleum products except for those used by ONEE for electricity generation and butane.

The phasing-out of fossil fuel subsidies was also a recommendation of the first EPR (Recommendation 4.3). This was only partially implemented since butane, which is mainly used by households for cooking, remains subsidized. The EPR also recommended revision of the functioning of the institution in charge of these subsidies (the Moroccan Compensation Fund), to target only poor households. This aspect of the recommendation has not been implemented.

Reducing fossil fuel subsidies is an important step towards SDG target 12.c. According to UNSTAT, the remaining fossil fuel subsidies were estimated at US\$407.8 million in 2019, up from US\$251.7 million in 2015. This could be explained by the increase in electricity production by ONEE over that period.

Investment incentives

Investment incentives have been adopted for foreign firms in general and for specific industries, including renewable energy and, in particular, the solar, wind and electricity transmission and distribution sectors.⁴⁴ Incentives include tax breaks, import duty waivers for raw materials and the provision of industrial parks and free trade zones.

Value added tax

The normal VAT rate in Morocco is 20 per cent ad valorem. Nevertheless, several exemptions exist, as well as reduced rates on goods and services that are likely to have a positive environmental impact.

According to the General Tax Code of 2021, solar panels and solar heaters are exempt from VAT, as well as goods purchased by the Mohammed VI Foundation that pertain to environmental protection. Water and sanitation services benefit from a reduced VAT rate of 7 per cent.

⁴⁴ Castelreagh Associates (2019), Morocco: An Emerging Economic Force, Opportunity Series n. 3.

Pesticides and fertilizers, as well as the equipment necessary for their use, are exempt from VAT. While this might be a measure to promote agricultural production in the country, those substances have well-known negative impacts on human health,⁴⁵ biodiversity and water ecosystems. Similarly, oil and gas derivatives benefit from a reduced VAT rate of 10 per cent.⁴⁶

Photo 3.2: Waste awareness raising, ministry in charge of the environment



Photo credit: ECE EPR Team

3.3 Evaluation of the impact of the country's efforts in greening the tax, tariff and subsidies systems on changing behaviours of the population, enterprises and public institutions

Morocco has made efforts to decrease harmful subsidies and launched several programmes to support the development of green energy sources. However, since the first EPR, there have been few to no changes regarding environmental taxes. In particular, Recommendation 4.1 of the first EPR regarding the creation of air and water pollution taxes was not implemented.

3.4 Investing in environmental protection and green economy

Implementation costs for environment-related strategies, programmes and plans

National Shared Sanitation Programme

The aggregate investment costs of the programme were estimated at 50 billion dirhams. Since 2012, the PN programme A is funded 50 per cent by the water and sewerage operators and 50 per cent by the Government. According to the information presented in the State budgets, the total amount allocated to the programme between 2012 and 2019 was 4.6 billion dirhams (approximately US\$480 million). The provision for the period 2021–2023 is around 2.7 billion dirhams (approximately US\$280 million), of which 80 per cent is allocated to the Ministry of the Interior and the remainder to the Ministry of Equipment and Water.

National Household Waste Programme

The PNDM was launched in 2007 for the period 2008–2023. It was designed to improve the collection, transport, treatment and disposal of household solid waste. Public funding for this Programme is channelled through the FNEDD and VAT support.

The estimated costs of the PNDM were 40 billion dirhams and split as follows: 72 per cent for waste collection and site cleaning, 14.6 per cent for the construction of controlled landfills and 13.4 per cent for other activities (including triage and recycling). New amounts are allocated for the 2020–2023 period as follows: 458.87 million dirhams in 2020, 435.92 million dirhams in 2021, 406.2 million dirhams in 2022 and 309.47 million dirhams in 2023.⁴⁷

National Programme for Waste Recovery

Since 2012, the Department of Sustainable Development has undertaken several actions with the relevant stakeholders to lay the foundations for the development of waste management channels through the PNVD. These include the establishment of appropriate legal frameworks, institutional arrangements ensuring good governance and the design of financing instruments. The main sectors concerned used tires, used lubricating oils, waste paper and cardboard, used food oils, waste electrical and electronic equipment (WEEE), construction and

⁴⁵ <https://apps.who.int/iris/bitstream/handle/10665/329501/WHO-CED-PHE-EPE-19.4.6-eng.pdf>.

⁴⁶ General Tax Code, 2021.

⁴⁷ www.finances.gov.ma/Publication/db/2021/06-%20Rapport%20CST_Fr.pdf.

demolition waste (CDW), end-of-life vehicles (ELV), plastic waste and used batteries. These sectors are at different levels of advancement.

By the end of 2021, the Government had signed 14 conventions with local authorities from these recycling sectors, for total public funding of 250.6 million dirhams, in addition to 85 million dirhams were allocated to the plastic bags collection campaign.⁴⁸ In addition, agreements had been signed with private partners (professional associations) from various recovery sectors.

National Air Programme

The PNAir was launched in 2018 and should run until 2030. Its main objectives are to strengthen the network for stationary monitoring of air quality, decrease emissions from the transport and industrial sectors, strengthen the legislative framework for air pollution and increase public awareness on air pollution issues. There are no quantitative estimations of the costs associated with this programme. The Government has assessed the cost of its implementation to 4.5 billion dirhams to ensure the implementation of this programme, a large part of which will be devoted to strengthening the air quality monitoring network by setting the target of setting up 140 stations by 2030.

Energy Development Fund

The Energy Development Fund was created in 2009 to promote the development of renewable energy sources in the country and decrease its dependency on the importation of fossil fuels (chapter 15). Over the period 2009–2019, the Fund has allocated 4,136 million dirhams. For the period 2016–2020, expenditures were split among ONEE, the Research Institute for Solar and New Energies (IRESEN) and Moroccan Agency for Solar Energy (MASEN) (table 3.14). For 2021, the provisions of the Fund include a payment of 200 million dirhams to MASEN and 38 million dirhams to IRESEN.

Table 3.14: Energy Development Fund expenditures, 2016–2020, million dirhams

	2016	2017	2018	2019	2020
ONEE	-	132.5	-	-	-
IRESEN	50.0	25.0	63.0	51.0	38.0
MASEN	-	-	-	312.5	-

Source: Report on the Treasury Special Accounts, 2021.

Green public procurement

In Morocco, the main regulatory text on public procurement (Decree No. 2-12-349) explicitly refers to sustainable development and environmental protection – in addition to social aspects – and fully authorizes and encourages the systematic integration of environmental and ethical requirements. The Decree integrates environmental protection as one of the general principles of public contracts in Morocco.⁴⁹

Nevertheless, a recent study on the implementation of green public procurement (GPP) practices in Morocco⁵⁰ shows that, while the legislative framework supports GPP, there is a need for training programmes for government employees, combined with systematic efforts to raise awareness and increase information and the involvement of the various partners and actors in public procurement. The authors also highlight the lack of reliable and easily accessible measurable data, particularly in terms of the percentage of public contracts that incorporate social clauses or environmental criteria.

Expenditure on environmental protection

No aggregate data on public and private expenditures on environmental protection are available. Using data from the annual budgets, and in particular the annual Reports on the Treasury Special Accounts, table 3.15 presents expenditures from a selection of national funds that contribute to environmental protection.

Public–private partnerships in support of green economy

Public–private partnerships (PPPs) in Morocco are managed through the Ministry of Economy and Finance (Department of Public Enterprises and Privatization) and subject to Law No. 54-05 on the Delegated Management of Public Services, Law No. 86-12 on Public–private Partnership Contracts and Decree No. 2-15-45 on the implementation of Law No. 86-12.

According to the PPP Knowledge Lab, more than 30 projects have been completed since 1990 for a total expenditure of US\$22.18 billion, mainly in the energy and waste treatment sectors. Table 3.16 presents completed PPP projects in Morocco since 2012.

⁴⁸ Ibid.

⁴⁹ <https://openknowledge.worldbank.org/bitstream/handle/10986/20553/901440BRI0Box30coll0KNOWLEDGE0NOTES.pdf?sequence=1&isAllowed=y>.

⁵⁰ El Haddadi, T., T. Mourabit and A. El Haddadib (2021), “Sustainable public procurement in Morocco: An investigative survey regarding tender preparation”, *Sustainable Production and Consumption* 26: 33–43.

According to the Ministry of Economy and Finance,⁵¹ a Strategic Investment Fund was created in the form of a special trust account, with a target size of 45 billion dirhams, under the provisions of Decree No. 2-20-528 of 12 August 2020. This Fund is intended, among other things, to support the financing of major public–private investment projects, in various fields of activity.

The promotion and use of PPPs are related to SDG target 17.17. According to data from the World Bank, from 2012 to 2020, PPPs in Morocco represented a total investment of almost US\$10 billion, around 93 per cent of which was in the electricity sector.⁵² The amount committed to PPPs for infrastructure was US\$257 million in 2019 (SDG indicator 17.17.1). In 2014, the amount committed to the same indicator was almost US\$3 billion.

Foreign direct investment

Inflows of foreign direct investment (FDI) in Morocco, as reported by the World Bank⁵³ and UNCTAD⁵⁴ were US\$1.6 billion in 2019. This represented 1.3 per cent of the country's GDP that year and around 11.7 per cent of the total inflow of FDI to North African countries (a group that also includes Algeria, Egypt, Libya, South Sudan, Sudan and Tunisia).⁵⁵

The National Exchange Office is responsible for, among other things, compiling the statistics on foreign exchanges. The Office provides more details on the sharing of FDI inflows by sector (table 3.17). In 2019, about 2.11 per cent of total FDI received in 2019 concerned investments in the agricultural, forestry and fishing sector, 2.83 per cent were invested in the electricity, gas and steam sector and 1.06 per cent went to the water, sewerage, waste management and depollution sector.

Table 3.15: Selected national funds expenditures, 2014–2019, million dirhams

	2014	2015	2016	2017	2018	2019
Energy Development Fund	75.80	542.81	50.00	157.50	63.00	363.50
National Fund for Environmental Protection and Sustainable Development	27.350	53.34	258.33	245.01	512.03	431.98
National Fund for Sanitation and Wastewater Treatment	371.50	399.7	647.87	676.64	616.00	571.08
National Forest Fund	569.49	597.11	668.98	649.84	676.70	735.68
Total	1 044.14	1 592.96	1 625.18	1 728.99	1 867.73	2 102.96

Source: Annual Reports on the Treasury Special Accounts.

Table 3.16: Public–private partnership projects since 2012, US\$ million

Project name	Sector	Financial closure year	Investment
Noor Midelt CSP-PV Plant Stage I	Electricity	2020	802.25
Taza Onshore Wind Power Generation Project	Electricity	2019	125.71
Tangier city waste treatment services	Treatment/ Disposal	2019	104.00
Oualidia I	Electricity	2019	12.90
Oualidia II	Electricity	2019	12.90
Khenifra household waste management	Collection and Transport	2019	1.43
Midelt wind farm	Electricity	2018	261.86
Agadir Desalination Plant Phase 2	Water and sewerage	2018	239.53
Noor PV I Solar Trio	Electricity	2017	220.00
Oum Azze Waste Processing Plant Expansion	Treatment/ Disposal	2016	132.00
NOOR III tower CSP	Electricity	2015	900.00
NOOR II Parabolic CSP	Electricity	2015	1 000.00
Safi Independent Power Project	Electricity	2014	2 621.58
Ourzazate Solar Phase I	Electricity	2013	1 438.00
ADWEA Jorf Lasfar IPP	Electricity	2012	1 413.00

Source: PPP Knowledge Lab, Morocco: <https://pppknowledgelab.org/countries/morocco>, accessed 2021.

⁵¹ www.finances.gov.ma/Publication/depp/2021/DEPP_SyntheseRapportEEP_EN.pdf.

⁵² <https://ppi.worldbank.org/en/snapshots/country/morocco>.

⁵³ <https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD>.

⁵⁴ <https://unctad.org/topic/investment/world-investment-report>.

⁵⁵ For reference, the five African countries receiving the highest inflows of FDI (more than US\$3 billion) are Congo, Egypt, Ethiopia, Nigeria and South Africa (UNCTAD, World Investment Report 2020).

Foreign assistance

Total official development assistance (net ODA) received by Morocco in 2019 was US\$757.9 million, which represented around 0.7 per cent of the country's gross national income (GNI).⁵⁶ Of this total amount, 38.66 per cent was allocated to economic infrastructure and 17 per cent to social infrastructure and services.⁵⁷

The main donors of ODA for Morocco in 2018–2019 were European Union institutions (US\$455.9 million), France (US\$409 million), Germany (US\$259.7 million), the Arab Fund for Economic and Social Development (US\$100.6 million) and the United Arab Emirates (US\$78.7 million).

Table 3.17: FDI inflows by sector, 2014–2020, million dirhams

	2014	2015	2016	2017	2018	2019	2020*
Agriculture, forestry and fishing	105	280	369	138	188	349	396
Extractive industries	207	101	-74	96	42	83	162
Manufacturing industries	7 316	5 679	3 235	4 532	4 661	6 184	5 449
Electricity, gas, steam and air conditioning	1 010	1 881	12	1 996	2 894	468	-672
Water, sewerage, waste management and depollution	499	307	134	226	73	175	125
Construction	1 387	2 776	1 483	110	1 177	320	376
Automobiles and motorcycle trade and repair	1 926	1 244	3 880	1 808	2 529	593	1 687
Transport and storage	120	276	422	1 696	3 747	1 342	688
Tourism accommodation and restaurants	2 736	2 159	684	463	1 839	1 814	775
Information and communication	1 184	3 162	348	473	2	-2 373	-495
Financial and insurance activities	2 367	2 423	71	4 786	9 774	832	2 501
Real estate activities	9 877	9 926	9 609	8 872	5 190	5 281	4 504
Specialized, technical and scientific activities	579	423	411	246	313	248	147
Other service industries	519	828	254	220	877	1 045	1 036
Total	29 934	31 781	21 156	26 033	33 404	16 541	16 744

Source: Office des Changes, Statistical series: www.oc.gov.ma/fr/etudes-et-statistiques/series-statistiques, accessed 2021.

Note: * Provisional data. Explanatory notes on FDI: www.oecd.org/daf/inv/FDI-statistics-explanatory-notes.pdf.

Photo 3.3: Electric car charging in front of the ministry in charge of the environment



Photo credit: Ouafa Sahli

⁵⁶ In calculating GNI in US dollars for certain operational and analytical purposes, the World Bank uses the Atlas conversion factor instead of simple exchange rates. The purpose of the Atlas conversion factor is to reduce the impact of exchange rate fluctuations in the cross-country comparison of national incomes.

⁵⁷ www.oecd.org/dac/financing-sustainable-development/development-finance-data/.

Global Environment Facility

The Global Environment Facility (GEF) has financed several projects in Morocco related to environmental protection and sustainability since 1994. For the GEF-6 System for Transparent Allocation of Resources period (2014–2018), the allocations for Morocco are presented in table 3.18.

European Union

The European Neighbourhood Instrument (ENI) was the key European Union financing instrument for bilateral cooperation with Morocco for the period 2014–2020. For this period, European Union bilateral assistance to Morocco amounted to €1.4 billion and focused on the priority sectors: equitable access to social services; democratic governance, the rule of law and mobility; employment and sustainable and inclusive growth; and enhanced capacity of civil society. The new Neighbourhood, Development and International Cooperation Instrument will frame cooperation with the European Union for the period 2021–2027. The Instrument's approach includes grant funding as well as blending grants with loans from European and international financing institutions.

Morocco has also benefited from funding under the European Union External Investment Plan and the blending mechanism of the Neighbourhood Investment Platform. Since 2007, these mechanisms have provided over €1.5 billion of investment for projects in the sectors of renewable energy, electrification, water, transport and urban development, and in support of micro, small and medium-sized enterprises.

One particular programme financed by the European Union is the Competitiveness and Green Growth Support Programme (PACC 2016–2022). Endowed with €105 million, it focused on supporting the implementation of the SNDD.

In a recent assessment of the impact of ENI funds allocated to Morocco, including the PACC, the European Court of Auditors noted that the programmes tend to focus on broad objectives, which were sometimes not ambitious enough.⁵⁸

France

France is a major provider of bilateral financial assistance to Morocco, mainly through the French Development Agency (AFD). Since 2013, the

amounts committed by the AFD in North Africa have increased by 20 per cent annually, on average, to reach around €1,430 million in 2019. Of this total, around 31.3 per cent (i.e., €447 million) was engaged in Morocco, with €231 million effectively transferred. Over the period 2017–2021, the AFD group has committed around €2 billion to projects in Morocco supporting education and youth employment, developing rural areas, improving urban environments, promoting energy transition and adapting to climate change.⁵⁹

Of the total amount committed in 2019, 45.2 per cent (€202 million) will go to projects related to infrastructure and urban development, 0.1 per cent (€0.4 million) to projects on the environment and natural resources and 0.2 per cent (€1 million) to projects linked to the water and sanitation sectors. The remaining amount is also allocated to other projects related to the priority sectors.

World Bank

Over the period 2012–2018, Morocco received support from the World Bank Group with, inter alia, Development Policy Loans (DPLs) in the areas of solid waste management and green growth (US\$400 million) and climate change mitigation (US\$3 million). The Bank also offered technical support and collaborated with the then Department of the Environment in the following projects: Technical Assistance Programme for Wealth Accounting and the Valuation of Ecosystem Services (WAVES) and Integrated Management of Coastal Areas.

The World Bank currently counts 24 active projects in Morocco, of which six deal with environmental protection, green growth and climate change. The total amount committed for these projects is US\$1,233 million. Table 3.19 summarizes these projects.

Other green economy initiatives

In 2020, nine projects for an amount of US\$225.7 million were financed through the Green Climate Fund (GCF): three were with the European Bank for Reconstruction and Development (EBRD), two with the French Development Agency (AFD), one with the Agency for Agricultural Development (ADA), one with the Dutch Development Bank (FMO), one with Pegasus Capital Advisors and one with the IUCN. Thus, within the framework of the promotion of direct access to the GCF, four entities are accredited, namely, ADA, CDG Capital, Attijariwafa Bank and

⁵⁸ <https://op.europa.eu/webpub/eca/special-reports/morocco-9-2019/en/>

⁵⁹ www.afd.fr/en/page-region-pays/morocco.

MASEN. Other entities are in the process of being accredited, namely, Crédit Agricole du Maroc, AMEE, Municipal Equipment Fund, Energy Investment Company (SIE), Moroccan Foreign Trade Bank, Guir-Ziz-Rheris ABH and Souss-Massa-Drâa ABH.

Moroccan Agency for Energy Efficiency

The funding for AMEE comes essentially from the State budget (87 per cent in 2019) with the remainder coming from both international and national partners. Of the funding coming from the State budget, around 40 per cent is used for investment expenditures while 60 per cent covers operating expenditures (table 3.20).

Table 3.18: GEF allocations for Morocco, 2014–2018, US\$ million

Focal area	Indicative allocation	Allocation utilized
Land degradation	4.77	4.77
Biodiversity	4.90	4.90
Climate change	4.85	4.50
Total	14.53	14.17

Source: GEF, Morocco, Country-at-a-Glance: www.thegef.org/country/morocco, accessed 2021.

Table 3.19: World Bank active projects in Morocco, 2020, US\$ million

Project name	Implementing agency	Approval date	Project closing date	IBRD commitment	Grant amount	Lending instrument
Green Generation Programme	Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests	15/12/2020	31/12/2025	250.0	0	
Urban Transport Programme	Ministry of the Interior	03/11/2020		150.0	0	Programme for Results Financing
Disaster Risk Management	Ministry of Economy and Finance	11/12/2019	15/06/2023	275.0	0	Development Policy Lending
Community-based Rural Roads Maintenance	Regional Government of Souss-Massa; Ministry of Equipment and Water; Ministry of the Interior	08/05/2019	31/12/2023	0.0	2.85	Investment Project Financing
Noor Solar Power Project Additional Financing	MASEN	08/06/2018		100.0	0	Investment Project Financing
Integrated Disaster Risk Management and Resilience Program	Ministry of Economy and Finance; Ministry of the Interior	20/04/2016	31/12/2021	200.0	0	Programme for Results Financing
Urban Transport Project (P4R)	Ministry of the Interior	09/12/2015	30/06/2024	200.0	0	Programme for Results Financing
Large Scale Irrigation Modernization Project	Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests	08/07/2015	31/12/2022	150.0	0	Investment Project Financing
Clean and Efficient Energy Project	ONEE	24/04/2015	31/10/2022	125.0	0	Investment Project Financing
Noor Solar Power Project	MASEN	30/09/2014	28/06/2024	400.0	0	Investment Project Financing
Rural Water Supply	ONEE	29/04/2014	31/12/2022	158.6	0	Investment Project Financing

Source: World Bank Projects and Operations database, accessed 2021.

Table 3.20: AMEE budget, 2019–2020, 1,000 dirhams

	2019	2020
State subsidies	63 000	63 000
International partners	10 462	17 000
National partners	2 027	2 000
Cash flow	2 018	11 000
Total	91 748	93 000

Source: AMEE Management Report, 2019.

In its latest available management report (2019), AMEE highlighted some threats and challenges to its missions, the biggest being insecurity regarding sufficient funding in the future. The need to strengthen AMEE's financial means and human expertise is also highlighted in the International Energy Agency (IEA)'s 2019 report on energy policies in Morocco.

Civil society initiatives

Moroccan civil society has begun to tackle climate issues, taking a critical approach to the State's policy. For example, the Moroccan Alliance for Climate and Sustainable Development (AMCDD) was founded in May 2015, bringing together Moroccan associations and networks active in the fields of climate change and sustainable development. In July 2016, with backing from the Multifunction Platform (MFP)/UNDP and the European Union, it organized a workshop to analyse and discuss the drafting and implementation of Morocco's public policies and international commitments to tackle climate change. The workshop pointed to the limited integration of Morocco's climate change policy in public policy and most sector plans.

3.5 Green markets and green jobs

The CGEM has created a distinguishing firms label that practise corporate social responsibility (CSR). All firms established in Morocco, and which are members of CGEM can apply for the label (chapter 2). Some of the conditions that firms need to respect pertain to environmental protection.

In the framework of the first phase of the SwitchMed Programme,⁶⁰ a European Union-funded programme aiming to develop sustainable production and consumption in the southern Mediterranean, a 2017 study analysed the promotion of green entrepreneurship in Morocco and highlighted three main challenges to the development of green markets. First, Moroccan consumers do not appear to be

sufficiently informed of the impact of their consumption choices on the environment. Second, the adoption of green products and technologies requires new habits and Moroccan consumers tend to be conservative and stick with products that they know. Finally, green products and technologies are often more expensive and are therefore not affordable for a significant number of consumers. While the affordability issue identified by this study is not easily solved in the context of a middle-income country such as Morocco, the first two challenges can easily be dealt with through increasing environmental education and information programmes.

A 2017 World Bank study⁶¹ has highlighted that there is no national entrepreneurship policy in Morocco, which would help to drive the green ecosystem. Difficulties faced by some entrepreneurs in accessing markets and finance mechanisms, and an underpromoted culture of entrepreneurship, hinder the development of the sector.

Several initiatives and programmes have been created to promote the creation of green jobs and green companies in Morocco, often in partnership with foreign organizations such as GIZ and the European Union. The three most prominent initiatives are Cleantech Morocco, the Green Business Incubator and Bidaya.

Cleantech Morocco

Morocco is part of the Global Cleantech Innovation Programme (GCIP),⁶² an initiative of the United Nations Industrial Organization (UNIDO) and GEF. GCIP aims to foster innovation and entrepreneurship ecosystems and catalyse investment to support and accelerate start-up entrepreneurs towards the development and commercialization of cleantech solutions to protect the environment. Its national counterpart in Morocco is the Ministry of Energy Transition and Sustainable Development through the Department of Sustainable Development. In its latest assessment (2017), GCIP noted that, despite a significant effort by the Government to become the North African leader in renewable technology commercialization, Morocco still lags behind in providing the necessary incentives and support structures for a thriving domestic cleantech innovation pipeline. And while the Government is dedicating significant funds to renewable energy projects, a

⁶⁰ <https://switchmed.eu/>.

⁶¹ World Bank, Igniting Climate Entrepreneurship in Morocco, Washington D.C., 2017.

⁶² This initiative is also conducted in Armenia, India, Malaysia, Pakistan, South Africa, Thailand and Turkey.

centralized system to support the financing of cleantech start-ups and SMEs is lacking.⁶³

Green Business Incubator

The Solar Cluster – an association created in 2014 by national solar energy firms – has launched the Green Business Incubator initiative in collaboration with the Moroccan Climate Innovation Centre. This initiative aims to fund innovative projects in the renewable energy and green tech sectors. Since its creation, the Incubator has supported the creation of around 70 green start-ups working on a variety of environment-related issues, such as recycling and waste management, digital solutions for environmental threat assessments, and the creation of a dry tanning machine that helps reduce water use in the leather industry, among others.

Bidaya

Bidaya is another green project incubator, which has been working in Morocco since 2015 and has assisted more than 80 new firms to have strong and positive social and environmental impacts. Examples of start-ups developed through Bidaya include an electrical bicycle producer, a firm constructing green roofs and urban vegetable gardens and another creating green thermic isolation panels.

3.6 Green finance

Both the Bank Al-Maghrib (BKAM) and the Moroccan Capital Markets Authority (AMMC) are members of the Sustainable Banking Network. The two institutions, together with the Moroccan Bank Association (GPBM), have issued a number of policy documents and guidelines to promote and guide the development of green finance in the country:

- Roadmap for aligning the Moroccan financial sector with sustainable development (BKAM, 2016);
- Green Bonds Guidelines (AMMC, 2016);
- Banks and Climate Charter (GPBM, 2016);
- Green, Social, and Sustainability Bonds Guidelines (AMMC, 2018);

- Guide on Green Bonds (AMMC, undated).⁶⁴

According to the AMMC, Morocco issued green bonds for the first time in 2015 for the funding of a solar energy project (chapter 15). Since then, four other issuances have been carried out, for a total of US\$420 million.⁶⁵ The bonds concerned projects linked to energy and energy efficiency.

In its latest Country Assessment Report (2019),⁶⁶ the Sustainable Banking Network acknowledged progress made by Morocco in developing green finance and considers the country to be in an advancing implementation phase.⁶⁷ The report listed some recommendations for next steps, including:

- Develop a comprehensive taxonomy for green assets;
- Create guidelines for green financial assets (other than green bonds);
- Develop climate and green investment reporting and require financial institutions to report on climate risk exposure at portfolio level;
- Develop a taxonomy of potential environmental impacts;
- Develop methodologies, tools, and/or templates to measure and report environmental impacts.

Bank Al-Maghrib is currently developing a new regulatory text, which is expected to introduce requirements for financial institutions to disclose information on environmental topics.⁶⁸

3.7 Climate change

Economic impacts from climate change on the tourism sector and costs of mitigation and adaptation

Due to a combination of political, geographic and social factors, Morocco is recognized as being vulnerable to climate change impacts and is ranked 64th of 181 countries in the 2019 ND-GAIN Index.⁶⁹ The sectors that are the most vulnerable to climate change are agriculture, fisheries, water resources, built infrastructure, human settlements and human health.⁷⁰

⁶³ www.unido.org/sites/default/files/files/2017-11/GCII_GCIP_report_2017.pdf.

⁶⁴ www.ammc.ma/sites/default/files/AMMC_Guide%20sur%20les%20Green%20Bonds_VF_0.pdf.

⁶⁵ www.ifc.org/wps/wcm/connect/e2e391bb-bb17-4b11-8cc1-52ba486d4d01/Green+Bonds+in+Morocco_02072019.pdf?MOD=AJPERES&CVID=mQwMGpM.

⁶⁶ www.greenfinanceplatform.org/research/country-progress-report-morocco.

⁶⁷ For comparison, countries like Egypt and Jordan are still in the preparation phase.

⁶⁸ Bank Al-Maghrib Management Report, 2019.

⁶⁹ <https://gain.nd.edu/our-work/country-index/>.

⁷⁰ https://climateknowledgeportal.worldbank.org/sites/default/files/2021-02/15725-WB_Morocco%20Country%20Profile-WEB.pdf.

The cost of adaptation strategies and plans in the period 2020–2030 are estimated to be US\$35 billion,⁷¹ while impacts from natural hazards are estimated to cost the country US\$800 million annually.⁷²

Tourism sector

Tourism in Morocco accounts for around 7 per cent of GDP and provides around 550,000 jobs (i.e., almost 5 per cent of total employment in the country).⁷³

The country expects 4.6 per cent growth in international arrivals and no significant change in the number of domestic tourists, increasing total tourist arrivals (domestic and international) from 32.9 million in 2015 to 43.2 million in 2030. As a result of this growth, tourism-related emissions are expected to grow from 20.3 Mt CO₂-eq. in 2015 to 37.3 Mt CO₂-eq. by 2030. This scenario considers efficiency gains of up to 3 per cent per year.

One of the channels by which climate change will affect the tourism sector in Morocco is through sea-level rise. Morocco's 3,500 km coastline is physically and socioeconomically vulnerable to accelerated sea-level rise, mainly due to its low topography and high economic, touristic and ecological values.⁷⁴ Moreover, a yearly rainfall decrease is expected, and an annual average temperature rise (up to 5°C for the south-east regions of the Atlas Mountains) is also expected, with various impacts anticipated. Water resources are especially vulnerable and are expected to decline significantly from 2020 onwards. Seasonality is also expected to be impacted, with longer periods of dry and hot weather. Tourism comfort – how amenable the weather is for tourists – which is evaluated combining different climate parameters, is expected to decline over the entire territory.

Considering this expected evolution of the sector and the importance of combating climate change, the Ministry of Tourism, with the support of UNDP and UNEP, has developed a National Appropriate Mitigation Action (NAMA) (a set of policies and actions that countries undertake as part of a commitment to reduce GHG emissions) for the tourism sector in Morocco.⁷⁵

The NAMA for the Moroccan tourism sector includes the following components:

- Capacity-building towards low-carbon and resource-efficient operations via training programmes and awareness campaigns for tourism operators and managers, as well as research programmes for the development of local green technologies and practices;
- The creation of specific investment funds;
- The sustainable procurement of goods and services (food and technical), from construction to room features;
- Awareness campaigns for customers and employees;
- The promotion of energy efficiency standards in the entire accommodation sector, based on existing programmes such as “Clé Verte”, “Eco Binayate” and “Bon pour le Climat” and through the implementation of a labelling programme for the accommodation sector.

These mitigation actions are expected to contribute to the reduction of GHG emissions by 1.1 Mt CO₂-eq. by 2030. This represents a 3 per cent reduction for the overall sector, compared with a scenario in which no mitigation actions are undertaken. Furthermore, implementation of the NAMA is expected to have social and economic co-benefits such as reduced private energy bills following energy efficiency training for personnel and increased job security for a more resilient tourism sector.

The NAMA programme is divided into two phases: (i) a preparation and pilot phase during the first three years, with an estimated cost between €1.8 and €6.5 million; and (ii) a full implementation and scale-up phase of four years, with an estimated cost between €123 and €243 million.

In terms of governance, the ministry responsible for tourism is the main supervisor of the implementation as well as the entity engaging with the concerned managers. UNDP and UNEP are the main partners of the ministry responsible for tourism. They provide assistance in defining the actions and projects to be undertaken and also assist the ministry in the implementation phase. AMEE and other national

⁷¹ www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco%20First/Morocco%20First%20NDC-English.pdf

⁷² www.gfdrr.org/sites/default/files/publication/FINAL%20-%20Results%20in%20Resilience%20-%20Integrated%20Disaster%20Risk%20Management%20in%20Morocco%20-%20204.24.18.pdf.

⁷³ <https://mtataes.gov.ma/fr/tourisme/chiffres-cles-tourisme/indicateurs-du-secteur-touristique/>.

⁷⁴ https://climateknowledgeportal.worldbank.org/sites/default/files/2021-02/15725-WB_Morocco%20Country%20Profile-WEB.pdf.

⁷⁵ www.oneplanetnetwork.org/sites/default/files/mor - advancescp-iki - nama.pdf.

partners provide technical assistance and contribute to training and dissemination.

By mid-2019, the following actions had been undertaken:⁷⁶

- Thirteen pilot hotels had undergone environmental audits and received environmental labels;
- The environmental performance monitoring and evaluation system for the ministry responsible for tourism was operational;
- A carbon footprint analysis of the tourism sector in Marrakesh was completed;
- A vulnerability study of the overall sector was completed, with a focus on women, which identified suitable adaptation measures;
- A summarized concept note of the NAMA was made available and can be used as an advocacy tool to develop projects and mobilize partnerships and resources.

3.8 Greening the transport sector through regulatory, economic, fiscal and information measures

In its NDC, the Government committed to reduce the country's GHG emissions by 17 per cent by 2030, compared with a BAU scenario. Efforts to mitigate emissions in the transport sector will amount to 9.5 per cent of all GHG reductions in the Moroccan NDC by 2030. The transport sector was responsible of 20.6 per cent of CO₂eq. emissions in 2018.

The transport sector in Morocco is under the responsibility of the Ministry of Transport and Logistics. According to data from the Ministry, 15 per cent of total public investments in Morocco is allocated to transportation infrastructure. In 2018, these investments represented 24.42 billion dirhams in different transport infrastructures, with 52 per cent for the road sector, 28 per cent for rail and 20 per cent for the maritime sector.

Road sector

Morocco's road network increased from 41,102 km to 57,334 km – a 39.5 per cent increase – between 2014 and 2018. The length of highways increased by 19 per cent in the same period and the country currently has around 1,800 km of highways. The Government has set an objective of 3,000 km of highways by 2030.

Traffic volume, measured in millions of vehicle-kilometres per day, increased by 62 per cent between 2008 and 2018.⁷⁷ Similarly, the number of vehicles in circulation increased by 874,000 units (22 per cent) in the period 2014–2018, 526,000 of which were passenger vehicles.

The development of the road network, especially in rural areas, is an important aspect for SDG indicator 9.1.1. In this regard, Morocco has implemented a specific programme for the development of rural roads. The Ministry of Transport and Logistics estimates that the proportion of people living within 1 km of a road increased from 34 per cent in 1994 to 79.3 per cent in 2017.⁷⁸ According to the 2020 VNR, the proportion of the rural population living within 2 km of an all-weather road was 79.3 per cent in 2017.

Scrapping bonus programme

Since 2006, Morocco has officially implemented a programme to renew the national vehicle fleet. The programme consists of scrapping bonuses given to freight transport operators for them to replace vehicles older than 15 years that had been operating for at least three months in the previous year. The bonuses were first set between 45,000 dirhams and 85,000 dirhams (US\$5,200–9,560 at 2006 exchange rate), depending on the vehicle's age and weight. However, they were considered too low, and the programme was not successful during its first phase (2006–2008).

The subsidies were then increased in the next phases of the programme and varied between 90,000 dirhams and 130,000 dirhams in 2008–2010 and between 115,000 dirhams and 155,000 dirhams in 2011–2013. According to data from the then Ministry of Equipment, Transport, Logistics and Water, in the period 2008–2013, 1,374 old vehicles were replaced, and the average fleet age declined from 14 years to 12.45 years.

In the 2014–2016 phase, the programme was extended to include passenger transport operators, with a distinction made between rural and urban operators. Scrapping bonuses were again increased and varied, as follows:

- 115,000–200,000 dirhams for freight transport vehicles;
- 90,000–130,000 dirhams for trailers and semi-trailers;

⁷⁶ <https://info.undp.org/docs/pdc/Documents/MAR/final%20progress%20report%202019-IKI.pdf>.

⁷⁷ www.equipement.gov.ma/Gouvernance/Chiffres-cles/Pages/Chiffres-cles.aspx.

⁷⁸ www.equipement.gov.ma/Gouvernance/Strategie/Pages/Strategie-du-Ministre.aspx.

- 70,000–110,000 dirhams for public transport vehicles in rural areas;
- Up to 400,000 dirhams for public transport coaches.

One main challenge to this type of programme is the informal nature of the transport sector, which can make it difficult to establish effective public policies. Indeed, over half of freight transportation services in Morocco are thought to be provided by informal carriers,⁷⁹ with a fleet of approximately 600,000 vehicles according to Government estimates. This hinders the type of data collection that could reorganize activities to improve the efficiency of logistic flows, as well as initiatives for renewing vehicle fleets.⁸⁰

In a further effort to green the country's vehicle fleet, since 2011, the Government has restricted import permits to vehicles under five years old, and those meeting the Euro IV standard. The transition towards the Euro VI standard should take place by 2023. These measures have halved the number of second-hand cars imported between 2010 and 2019.⁸¹

While Morocco does produce electric vehicles (EVs),⁸² they remain too expensive for most of the population. There is no ecological bonus specifically targeting the purchase of EVs. There is, however, a reduced VAT rate of 10 per cent on the import of EVs. Buyers of EVs are also constrained by the lack of public charging terminals: as at 12 August 2021, there were 92 chargers throughout the country, in 57 different locations.⁸³

Railways

Morocco has the second largest railway network in operation in Africa, after South Africa. The Government spends around 7 billion dirhams annually on the railway sector. The classic railway network has remained stable since 2014, with 2,169 km, but 200 km of high-speed tracks were added to the network in 2018. Almost 800 km of railway lines are double tracked.

Most of the rail lines are concentrated in the north of the country, with Marrakesh-Oujda being the main

line in the network. Still, the rail network serves more than 50 per cent of the Moroccan population.

The National Railway Office (ONCF), a public company, is currently responsible for the infrastructure and is the sole railway operator for the national network. Railway operations are nevertheless currently opening to tender competition. With the opening, ONCF will continue managing the network but would enter into competition with other operators and henceforth be registered as a limited liability company.⁸⁴

In its Rail Plan 2040, the Ministry of Transport and Logistics announced an extension of the conventional rail network by 1,600 km and that of the high-speed rail network by 1,100 km. These extensions have an estimated cost of 221 billion dirhams. The networks should connect 87 per cent of the population, 43 cities and 15 international airports within the country.

The railway sector is responsible for between 2 and 4 per cent of CO₂ emissions in Morocco, whereas 60 per cent of emissions come from road transportation.⁸⁵ The development of railways and maritime transport of passengers and freight in the country would enable a decrease in GHG emissions. National authorities are seeking to increase railway decarbonization gains, by ensuring that half the electricity used to fuel railway transport is renewable by the end of 2021.

Data on passenger and freight volumes by mode of transport (SDG indicator 9.1.2) reported by UNSTAT confirm that most of the passenger and freight transport in Morocco is dominated by road. In 2019, 81.7 per cent of passenger volume was by road, 12.2 per cent by air and 6.1 by rail, and 89.9 per cent of freight volume was by road, 0.4 per cent by air and 9.7 by rail.

Local public transport

The local authorities in the main urban areas of Morocco implement programmes to improve the mobility of their residents. These programmes promote the adoption and use of sustainable transport means, encourage the elimination of unnecessary trips and improve the energy efficiency and operational

⁷⁹ Informal carriers are operators transporting passengers and/or merchandise but not officially registered as such.

⁸⁰ www.itf-oecd.org/?msclkid=2f8cf83cbee811ecad68c8aef23a4403.

⁸¹ Ibid.

⁸² Three vehicle manufacturers produce EVs in Morocco: Renault, Peugeot and Byd.

⁸³ www.electromaps.com/en/charging-stations/morocco.

⁸⁴ <https://documents1.worldbank.org/curated/en/741961485508255907/pdf/105633-WP-P153448-FRENCH-PUBLIC-Maroc-Etude-CDE-Final-logo-Janv-2017.pdf>.

⁸⁵ www.ammc.ma/sites/default/files/NI_ONCF_EO_018_2015.pdf.

efficiency of transport modes. In Casablanca, the authorities are focused on developing an additional public transport network of almost 100 km by 2025, made up of four tram lines and two rapid bus lines (Bus Rapid Transit or BRT).⁸⁶ The authorities in Rabat have also invested in developing the transport infrastructure and have created a 20 km tram network, as well as a 39 km network of rail-replacement buses, between 2011 and 2019. Beyond improving infrastructure, local authorities are also seeking to promote the use of “soft” transport. Marrakesh, for instance, has launched the first bike-sharing scheme in an African city, with an initial fleet of 320 bikes.⁸⁷

On a national level, several ministries support the initiatives of Moroccan local authorities. The Ministry of the Interior, through the General Directorate for Local Authorities, contributes to monitoring and supporting local authorities in their implementation of local public services. It also manages the Support Fund for Transport Reform (FART), made up in part from local government contributions of VAT (CAS-TVA), as well as from the general budget. The Ministry of Transport and Logistics is responsible for regulating transport services for professionals, including school transport services. It also provides technical support to local authorities who want it. The Ministry of Land Management, Urban Planning, Housing and Urban Policy establishes national regulations for urban planning and land use, which can shape urban mobility policies.

3.9 Legal, policy and institutional framework for greening the economy

Legal framework

Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development stipulates that the State, local authorities, public establishments, State companies and private companies encourage and finance the establishment of research/development programs serving sustainable development and the green economy.

Law No. 13-03 stipulates the necessity to decrease air pollution emissions but does not mention taxes or charges for air emissions. More concrete measures are stipulated in Decree No. 2-09-286 of 8 December 2009 setting the air quality norms to be respected and the organization of air quality monitoring, and Decree No. 2-09-631 of 6 July 2010 setting the maximum emission levels from fixed pollution sources.

Law No. 13-09 on Renewable Energies was promulgated in 2010 to liberalize and develop the renewable energy sector in Morocco through the opening of renewable electric and thermic production to competition. The Law was modified and completed by Law No. 58-15 in 2016, which allows independent producers to access the low voltage grid and sell surplus renewable energy to ONEE, and the implementation of Decree No. 2-10-578 of 11 April 2011, which allowed for the opening of renewable energy production to the private sector. The 2008 Law No. 16-08 enables industrial installations to produce up to 50 KW of their own electricity from renewable energies. The 2015 Law No. 54-14 allows national electricity own-producers to join the transmission network to carry energy from production sites to consumption sites.

Law No. 47-09 on Energy Efficiency dated 29 September 2011, Law No. 48-15 dated 24 May 2016, on the regulation of the electricity sector and the establishment of ANRE and Law No. 16-09 dated 11 February 2010, further amended by Law No. 39-16 dated 25 August 2016, created a national agency for the development of renewable energies and energy efficiency (AMEE) to support the improvement of the energy sector.

The 2016 Law No. 36-15 introduces reforms aimed primarily at consolidating and strengthening decentralized, integrated and participatory management and planning of water resources. It also aims to strengthen consultation and coordination bodies and organizations through: the establishment of ABHs and legal foundations, to diversify supply through the use of unconventional water resources including desalinated seawater; implementing water-related information systems; strengthening the institutional framework and mechanisms for the protection and conservation of water resources; and strengthening financial instruments for the development of the water sector based on the polluter-pays principle.

The main legislative act concerning solid waste management in Morocco is Law No. 28-00 on Waste Management and Disposal of November 2006, later modified by Law No. 23-12 of August 2012. Law No. 22-10 of 16 July 2010 and its implementation decrees regulate the use of plastic bags and prohibit non-degradable bags. Decree No. 2-17-587 regulates the import, export and transit of waste, and several other decrees were issued that deal with specific categories of waste. Finally, in an effort to limit non-

⁸⁶ <https://casatransport.ma/>.

⁸⁷ <https://medinabike.ma/en>.

organic waste, the 2015 Law No. 77-15, also known as the Zero Mika Law, bans the use, production or import of plastic bags throughout the country. However, several surveys implemented in the years following the adoption of the Law show very low degrees of implementation.

Public procurement rules in Morocco are stipulated in Decree No. 2-12-349 of 20 March 2013. This decree represents the result of wide consultation undertaken with the main stakeholders in the country – public entities, firms, regulatory agencies and international partners. It clearly stipulates that environmental protection and sustainable development are key principles for public procurement in Morocco. It also greatly simplifies the procurement procedures and reinforces competition among potential bidders.

Policy framework

The 2009 National Energy Strategy aimed at strengthening the security of the country's energy supply as well as securing general cost-effective access to electricity. It also accelerated the development of renewable energies to reduce energy dependence and decrease GHG emissions (chapter 15).

The PNAM focuses on the role of complementary water management actions to address water problems and achieve coordinated management of supply and demand, while ensuring equitable distribution between rural and urban areas (chapter 9).

The PNDM is an investment programme with a budget of 40 billion dirhams under the supervision of the Ministry of the Interior in collaboration with the Department of Sustainable Development (chapter 10). A first assessment of the PNDM conducted in 2016 – in the run-up to COP22 in Marrakesh – produced mixed results. In particular, the country is still a long way from reaching its objective of equipping all urban municipalities with controlled landfills: in 2018, only about 20 controlled landfills were operational, of the 75 planned for 2020. Local authorities contribute 73 per cent of the total cost of the PNDM, 12 per cent comes from taxes on waste and other taxes, 9 per cent comes from the State budget, 4 per cent comes from international cooperation and 3 per cent comes from clean development mechanisms.

The 2019 National Strategy for Waste Reduction and Recovery is now the backbone of Morocco's new ambitions to “make progress [...] in applying a waste treatment hierarchy”. It defines recycling targets for each waste sector by 2030: 20 per cent for household waste (compared with 6 per cent in 2015), 70 per cent

for plastic (25 per cent in 2015) and 25 per cent for industrial waste (12 per cent in 2015). The creation of 25,000 jobs is expected in this sector, which aligns with the green economy objectives of the SNDD.

Morocco initiated its national low carbon strategy to 2050 by defining an integrated, common and shared “Morocco Vision 2050”, establishing the main orientations of the Moroccan economy and society between 2020 and 2050, ensuring synergies between sectoral strategies that have different medium- and long-term objectives and envisaging profound economic and social transformations in a carbon neutral world.

In 2021, Morocco developed the Qualitative Low Carbon Strategy to 2050 as its long-term low emissions development strategy (LT-LEDS), based on the strategic axes of the New Development Model by 2035, the new GHG mitigation ambition of the revised NDC (45.5 per cent by 2030) and the sectoral roadmaps, among other things, with a view to achieving climate neutrality in this century.

This Strategy will be complemented by the development of a quantitative strategy outlining sectoral decarbonization plans, based on a modelling exercise of development and emission trajectories and an analysis of sectoral dynamics, again with a view to achieving climate neutrality this century.

Institutional framework

From 2016, the Department of Sustainable Development was responsible for implementing the green economy. In 2020, responsibility for the green economy was transferred to the then Ministry of Industry, Trade and Green and Digital Economy; nonetheless, the current Department of Sustainable Development continues to coordinate the implementation of the SNDD, which includes the green economy.

The Ministry of Energy Transition and Sustainable Development develops and implements general policies regarding waste management and is responsible for overseeing the implementation of the national programmes related to waste management and recycling.

ONEE has a monopoly on electricity transmission. Distribution activities are operated either by municipalities (through a municipal electricity distribution service or a delegation to private concession holders) or by ONEE directly in locations that are not served by municipal distribution services or private concession holders.

ANRE monitors the free market in electricity generated from renewable sources and regulates self-producers' access to the national electricity transmission grid. In particular, ANRE is in charge of:

- Approving the rules and tariffs for access to electricity interconnections and for selling electricity;
- Setting tariffs for the use of the medium-voltage electricity distribution grids;
- Giving its opinion, at the Government's request, on draft legislative and regulatory texts relevant to the electricity sector, as well as proposing laws and regulations on its own initiative.

The Ministry of Equipment and Water is responsible for initiating, promoting and coordinating the protection of water resources, pollution abatement and legislation enforcement. It is also responsible for environmental control, auditing and reporting. The DGE has been assigned the executive role regarding water issues.

The DGE is the lead agency for water resource planning and management. It is responsible for developing water resources for all uses, including major dam construction and operation. The role of DGE is being redefined, with some of its responsibilities being transferred to the ABHs and ONEE.

The Ministry of the Interior is involved in water management through its Directorate for Water and Wastewater (DEA) and General Directorate for Local Authorities (DGCL). The former assists local communities with water and sanitation issues and the latter supervises municipalities and monitors communal utilities.

The Ministry of Economy and Finance is responsible for fiscal aspects of public utilities and the contracting of concessions, as well as tariff adjustment proposals.

The mission of the ABHs includes managing and regulating water resources, as well as developing and supplying water, monitoring and regulating water use and quality, and planning for water-related emergencies such as flood control within their respective basins. ABHs are legally and financially independent as they are funded by users' fees.

According to the 1976 Communal Charter, municipalities have full responsibility for the management of drinking water and sanitation services. Municipalities may, therefore, manage these services themselves, create autonomous communal utilities or assign the management to ONEE or private

concession holders. Municipalities are also responsible for household and similar solid waste management. Intermunicipal cooperation mechanisms to achieve common infrastructure, such as transfer centres and stations or technical landfills, are also used. Municipalities benefit from support from the Municipal Equipment Fund, which coordinates activities within waste management.

Service providers include ONEE and private companies. ONEE is the major national water producer and, when rural water supply is included, it is also the dominant national water distributor. It plays an important role in planning and executing the Government's strategic water and electricity goals.

One of AMEE's missions is to supervise the implementation of energy efficiency audits. These audits are mandatory for: (i) all firms in the industrial sector with energy consumption above 1,500 tons of oil equivalent per year, and (ii) all firms in the tourism, health, education, trade and services and energy sectors with energy consumption above 500 tons of oil equivalent per year. AMEE is in charge of collecting the audits, controlling their quality, creating a database on energy efficiency, maintaining a list of authorized auditing firms and ensuring that audited companies implement the recommendations of their audits. Since the new government in October 2021, AMEE, which was under the umbrella of the Ministry of Industry and Trade, is now under the Ministry of Energy Transition and Sustainable Development.

Public-private partnerships

PPPs are regulated by Law No. 54-05 of 14 February 2006 on the Delegated Management of Public Services and Law No. 86-12 of 24 December 2014 on Public-private Partnership Contracts. The 2020 Law No. 46-18 amending and supplementing Law No. 86-12 introduces new provisions, including the definition of PPPs as "fixed-term contracts, through which a public entity transfers to a private operator the execution of a project, including the design, total or partial financing, construction, rehabilitation or maintenance of infrastructure, equipment and goods, or the provision of services".

At the national level, PPPs are managed by the Ministry of Economy and Finance through its PPP Unit.

A PPP Commission was established in 2015. It is composed of members representing the following ministries: Ministry of Economy and Finance (4 members); Ministry of Energy Transition and Sustainable Development (1 member); Ministry of

Equipment and Water (1 member); Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests (1 member); and Ministry of Industry and Trade (1 member). The Commission's role is, among other things, to comment on the opportunity to implement a given project as a PPP and on suggestions or recommendations for new legislation regarding PPPs. However, the draft application decree of Law No 46-18 also foresees the establishment and composition of a new commission.

The main PPP procuring authorities are the State, public law entities and public law companies. The public law companies that may enter into a PPP contract are: (i) state companies whose share capital is wholly owned by public entities; (ii) public subsidiaries, more than half of whose share capital is held by public bodies; and (iii) mixed companies, up to 50 per cent of whose share capital is owned by public entities. Local authorities are excluded from PPPs.

3.10 Assessment, conclusions and recommendations

Assessment

The use of economic incentives for greening the economy is based mainly on subsidies. No taxes on air pollution or waste generation are in place. Charges on water pollution are quite low and only represent around 1.5 per cent of the ABHs' budgets. Also, discharges into seawater, which represent the bulk of water discharges, are exempt from taxes. Finally, Morocco implements a tax on plastic products, the proceeds of which are allocated to the FNEDD. Morocco also levies user fees for water abstraction, though these are low, and also for quarries' extraction.

In the energy sector, the country levies excise duties on most energy products, with the exception of fossil fuels destined for electricity production.

Regarding municipal utility services, tariffs paid are differentiated by user type (domestic, industrial and service industry users) and quantity consumed, with some degree of cross-subsidization. The first EPR recommended the creation of an independent national regulatory agency for the water and electricity sectors (Recommendation 4.2). This recommendation was partially implemented by the creation of ANRE, established on 19 June 2016 in accordance with the provisions of the Law No. 48-15.

Water tariffs, however, continue to be set by the Government. Both water and electricity tariffs have been increased regularly so as to cover maintenance

and network upgrading costs. PPPs have been used quite extensively in the renewable energy and waste management sectors. However, while procurement legislation does mention the need to take sustainability and green objectives into account, green public procurement is not yet *de facto* implemented.

The country has developed guidelines and policy documents to foster green finance. However, green jobs and green markets are in the early stages of development. Private sector actors identify environmental awareness and financial constraints as the main challenges to the expansion of green markets. Regarding green finance, five green bonds were issued for an approximate amount of US\$420 million.

Concerning the recommendations of the first EPR on economic instruments and expenditures for environmental protection, the country has implemented only part of them. Recommendation 4.1 urging the Government to create air and water pollution taxes has not been implemented; however, the Government remains in charge of setting the water tariffs. Recommendation 4.3 has not been fully implemented. Butane is still subsidized and no revision of the functioning of the institution in charge of these subsidies (the Moroccan Compensation Fund) has been made, and subsidies are distributed widely rather than only targeting poor households. A new national fund, the FNEDD, was created through Framework Law No. 99-12 in 2014 and finances multiple projects and initiatives leading to the implementation of Recommendation 4.5.

Progress on the achievement of relevant SDGs is mixed. About 30.3 per cent of households had access to all basic services in 2017, which present a challenge in achieving SDG target 1.4. Regarding SDG target 9.1, thanks to the development of the road network, the proportion of the rural population who live within 2 km of an all-season road has increased, which puts the country on track to achieve the target. However, the mode of transport for passengers and freight mainly remains by road.

The development of rail would release pressure on the environment by reducing GHG emissions and allow the country to make progress towards achievement of SDG target 9.1. SDG target 12.c is not achieved as, in 2019, the total fossil fuel subsidies amounted to US\$407.8 million. Efforts are made to promote PPPs, which corresponds to progress towards achievement of SDG target 17.17, with a total investment of around US\$10,000 million. No data are available on targets 8.3, 11.4, 12.7 and 17.2.

*Conclusions and recommendations*Reinforce pollution abatement and resource conservation through appropriate taxation

As at June 2021, environmental taxation is not developed, in particular with regard to air and water pollution and waste generation. Water extraction fees exist but they have not been updated, which hinders incentives for water conservation.

Recommendation 3.1:

The Government should:

- (a) *Revise the existing economic incentive mechanisms and adjust them to give a price signal and stimulate pollution abatement and resource conservation, considering the concerns of poor and vulnerable parts of the population, by creating annually inflation-indexed taxes on air pollution and waste generation, and revising the tax base, also annually inflation-indexed for water pollution and water abstraction fees;*
- (b) *Operationalize the fee for the management of household solid and similar waste;*
- (c) *Consider additional revenues from this revision to increase environmental protection expenditures.*

Phasing-out of fossil fuel subsidies

Some indirect subsidies to fossil fuels remain in place: fossil fuels for electricity generation are exempt from excise duties and fossil fuels in general benefit from a reduced VAT rate of 10 per cent. Additionally, diesel still benefits from lower excise duties compared with gasoline. The tax expenditures associated with these indirect subsidies and the diesel differential remain high.

Recommendation 3.2:

The Government should continue the phasing-out of fossil fuel subsidies and gradually eliminate the differences in excise duties between gasoline and diesel, while taking into account social concerns.

Regular reporting of the environmental and financial impact of national programmes related to green economy

Morocco implements a number of national programmes that are likely to have strong environmental impacts. However, the impacts are not regularly assessed and openly reported. Progress is difficult to measure, thus impacting on the possibility of implementing revisions.

Recommendation 3.3:

The Government should ensure periodic evaluation reports of the financial costs and environmental impact of national programmes related to green economy and make these reports publicly available.

Green public procurement

Green public procurement is a potential major instrument for environmental protection. Moroccan legislation does mention environmental protection and sustainable development as factors to consider during public procurement. However, this is currently not implemented due to the lack of knowledge and concrete guidelines that public administration agents can follow.

Recommendation 3.4:

The Government should ensure that:

- (a) *National guidelines for green public procurement are developed and disseminated among all relevant public servants and other stakeholders;*
- (b) *Government officials are trained to increase their knowledge on green public procurement practices.*

Promotion of green markets and private sector green entrepreneurship

Morocco has some initiatives to support green entrepreneurship, but these are not developed and there is room to upscale them. Environmental awareness is not promoted sufficiently and there are too few information campaigns aimed at the general population. Finally, while green innovation and green growth rely on the development of human capital and education, investments in these areas are too low.

Recommendation 3.5:

The Government should:

- (a) *Strengthen the support for green entrepreneurship via facilitated access to funding, dissemination of green market information, tax incentives and green grants;*
- (b) *Strengthen the process of environmental awareness-raising among the population via information campaigns;*
- (c) *Continue to develop the offer of professional and academic training in environment- and energy-related areas and introduce these issues in business management curricula.*

Chapter 4

ENVIRONMENTAL MONITORING AND INFORMATION

4.1 Environmental monitoring

Monitoring networks

Air

The network for stationary monitoring of air quality in Morocco was established in 2003. As at June 2022, there are 36 fixed monitoring stations in 15 cities, covering seven regions, and four mobile stations. Morocco also has 39 meteorological stations in different cities. According to the PNSQA for the period 2018–2030, the number of air quality monitoring stations will be extended to 140 stations by 2030.

As at April 2021, air quality parameters being measured cover sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (PM₁₀), ozone (O₃) and carbon monoxide (CO). While the Department of Sustainable Development only monitors particulate matter with a diameter of less than 10 µm (PM₁₀),⁸⁸ estimates for PM_{2.5} are being reported on. Two mobile units of LNEP, which assess the quality of ambient air, can furthermore check for BTEX compounds (e.g., benzene, toluene, ethylbenzene and xylene). Meteorological parameters such as rainfall, humidity, wind and temperature are also being monitored and reported on.

Projects and initiatives to further improve air monitoring in Morocco are ongoing. For instance, in 2018, a Cooperation Agreement was signed between the Department of Sustainable Development and the Climate and Clean Air Coalition to initiate a national short-lived climate pollutant (SLCP) mitigation planning process through the supporting national action planning initiative.⁸⁹

Outputs from this project are expected to be a national SLCP plan for Morocco as well as the integration of SLCPs into the National GHG Inventory System.

Steps have also been taken to establish a monitoring plan for persistent organic pollutants (POPs). This has been done as part of a GEF-funded global POPs monitoring project under the Stockholm Convention. Most recently, a project led by the Chemicals Branch of UNEP has set out to detail different activities related to the sampling and analysis of POPs in air, breast milk and matrices of major national interest (water and sediment). It is foreseen that a database gathering all the information collected under this project will be developed as part of Morocco's national and global POPs monitoring plans.

Another example relates to the testing of an urban air pollution monitoring system (MoreAir)⁹⁰ based on mobile and nomadic sensors, as well as on medical data, to identify urban areas with high prevalence of respiratory diseases. This system is presently providing real-time air quality information (or pollution maps) to citizens in Rabat on PM_{2.5} and PM₁₀ concentrations, including weather data (e.g., temperature and humidity).

It can be noted that Morocco also issues national communications and biennial reports on:

- Evolution of national GHG emissions;
- GHG emissions by type of gas;
- Evolution of GHG emissions by sector in Gg CO₂-eq.;
- Distribution of CO₂ emissions from the energy sector;
- Trends in the consumption of ozone-depleting substances (ODS).⁹¹

⁸⁸ The available monitoring data include the average daily PM₁₀ concentrations for the period 2012–2015 provided by measuring stations in Casablanca, Mohammedia, Marrakesh, Tangier, Fès, Agadir, El Jadida, Safi, Salé, Essaouira, Khouribga and Benslimane.

⁸⁹ <https://ccacoalition.org/en/activity/morocco-national-planning-short-lived-climate-pollutants> (accessed 9 March 2021).

⁹⁰ <http://moreair.info/pollution-map> (accessed 14 June 2021).

⁹¹ www.environnement.gov.ma/PDFs/publication/SEDD_Rapport_du_Co%C3%BBt_de_la_d%C3%A9gradation_au_Maroc_Janv_2017.pdf (accessed 14 June 2021).

Water

The first permanent hydrological station was installed and equipped in 1918. However, it was only after the launch of the “dam policy” in 1967 that the number of hydrometric stations increased significantly. For instance, there were 35 stations in 1956, 235 stations in 1996, and 265 hydrometric stations and 380 rainfall stations in 2014. The hydrological network has been designed to provide data on the spatial and temporal variability of hydrometric (e.g., water level and flow of rivers and springs) and climatological parameters (e.g., rain, temperature, evaporation, wind speed and direction, humidity, insolation).

Morocco also has a network of piezometers. The role of the piezometric network is to measure the variations in the water level of aquifers, to know the state of the groundwater resource (recharge or discharge of the aquifers), predict the evolution of the flow of the watercourses and improve knowledge of the underground flows.⁹² However, the exact scale of the network has not been reported, although the Sebou ABH reports having 102 piezometers.⁹³

The monitoring of water quality focuses on 1,086 catchments, 51 dam reservoirs, 76 controlled treatment plants, 65 controlled wastewater treatment plants (WWTPs), 4,771 drinking water network points and 1,350 tanks. Surface and groundwater quality is measured through:

- Physiochemical parameters (organic and non-organic): ammoniacal nitrogen (NH₃-N), total nitrogen (NO₃-N), nitrite-nitrogen (NO₂-N), ammonia-nitrogen (NH₃-N) and organically bonded nitrogen, nitrates and nitrites, chemical oxygen demand (COD), suspended and volatile matter (VSS), dry residue and total dry residue, conductivity, pH, turbidity, biochemical oxygen demand (BOD), alkalinity, hardness and calcium, anions by ion chromatography, oxidizability, metals, free cyanides, anionic detergent, phenol index, chlorophyll, organochlorine pesticides and polychlorinated biphenyls (PCBs) in water, trihalomethanes, total organic carbon (TOC), polycyclic aromatic hydrocarbons (PAHs) in water, volatile compounds, total hydrocarbons and organophosphate pesticides;
- Bacteriological parameters: coliform bacteria in treated waters, revivable microorganisms in nutrient agar culture medium at 22°C and 37°C, intestinal enterococci in treated waters, total coliforms and faeces in natural and waste waters,

faecal streptococci in natural and waste waters, spores of sulphite-reducing anaerobic microorganisms (Clostridia) in treated waters, staphylococcus aureus in water, pseudomonas aeruginosa in water and salmonella in water;

- Parasitological parameters: helminth eggs in wastewater and natural waters, helminth eggs in treated waters, helminth eggs in sludge, cryptosporidium and giardia in treated waters and helminth eggs in sludge;
- Toxicological parameters: acute lethal toxicity to freshwater fish *Brachydanio rerio*, acute lethal toxicity assessment to freshwater microcrustacean *Daphnia magna*, freshwater algal growth inhibition test with single-celled green algae, growth inhibition of freshwater algae with single-celled green algae;
- Hydrobiological parameters: phytoplankton in pre-treated and treated waters, phytoplankton in natural and waste waters, zooplankton in pre-treated and treated waters, zooplankton in natural and wastewater and algal toxins.

Within the framework of quantitative and qualitative monitoring of raw continental water resources, the DGE, in collaboration with the ABHs, has a network for monitoring the quality of water resources, which comprises 895 sampling stations and largely covers the main rivers, dam reservoirs and water tables. It is denser at the level of critical and sensitive areas with regard to domestic, industrial and agricultural sources of pollution.

During the period 2019–2020, more than 220 surface water quality monitoring stations were sampled on the main rivers. For water bodies, 75 dam reservoirs and natural lakes were monitored, generally at three depths, representing 190 sampling stations. As for groundwater, 600 sampled water points allowed the monitoring of 65 water tables.

For the majority of water basins, the frequency of analyses concerned two periods: high and low water for both surface water and groundwater. For some water basins, surface water campaigns were carried out up to four times a year for specific stations. The total number of analyses reached 79,466 analyses: in situ parameters (T, Ph, Cond, O₂, DS), and major ions: pollution parameters (e.g., TSS, BOD₅, COD) and bacteriological parameters. Regional data are then collected at the central level for the periodic elaboration of the report on water quality in Morocco; the latest version for the period 2018–2020 is currently being edited. This report will contribute to the

⁹² <http://81.192.10.228/patrimoine/reseau-hydrogeologique/>.

⁹³ www.abhsebou.ma/domaines-dactivites/suivi-ressources-eau/evolution-quantitative/.

elaboration of the state of the environment. The state of water quality drawn up also makes it possible to respond at the international level to SDG target 6.2.

Bathing water

The monitoring of bathing waters in Morocco started in 1993, initially covering 18 beaches. As at 2020, Morocco had 461 bathing water quality testing stations, distributed across 175 beaches and the coastal regions.⁹⁴ The aim is to reach 195 beaches by 2023. The distribution of the monitoring stations is as follows: Oriental (28 stations), Tangier-Tétouan-Al Hoceima (168 stations), Rabat-Salé-Kenitra (47 stations), Casablanca-Settat (107 stations), Souss-Massa (48 stations), Marrakesh-Safi (29 stations), Guelmim-Oued Noun (17 stations), Laâyoune-Saguia El Hamra (13 stations) and Dakhla-Oued Dahab (4 stations). Bathing waters are monitored from May to September, with a reference campaign during February and March. The sampling frequency is fortnightly during the bathing season.

Before 2014, the assessment of bathing water quality was based on the Moroccan Standard NM 03.7.200. Since 2014, it is based on NM 03.7.199, which relates to the monitoring and evaluation of the hygienic quality of beaches. The new standard lays down provisions concerning the monitoring and classification of bathing water quality according to four categories (good quality, average quality, momentarily polluted, bad quality), the management of bathing water quality and steps to inform the public about the quality of bathing water. The assessment of bathing water quality covers two microbiological parameters: *Escherichia coli* (*E. coli*) and intestinal enterococci (EI), as well as temperature and pH.

The classification of bathing waters is based on statistical values of the 90th and 95th percentiles calculated from the results of the current year and the three previous bathing seasons, and then compared with the set limit thresholds. In 2020, 422 stations had enough samples to be able to measure the quality of water in accordance with the new standard. As at 2020, of the sampled beaches, 87.68 per cent complied with the standard, while 12.32 per cent did not conform to the threshold.⁹⁵ Morocco has also monitored sand quality, including marine waste from beaches, since 2018. This monitoring is being carried out at approximately 60 beaches and involves mycological analysis as well as typology campaigns for marine waste on beaches.

The results of monitoring bathing waters are presented in an annual report on the monitoring of bathing water quality of Morocco's beaches. The report covers the following indicators: (1) Number of bathing water profiles carried out and programmed per year since 2013; (2) Evolution of the number of beaches per region; (3) Breakdown of beaches and sampling stations by monitoring area; (4) Distribution of beaches and sampling stations according to quality categories (Category A, B, C, D); (5) Quality of bathing water; (6) Evolution of the number of beaches covered by the national programme on bathing water quality monitoring; (7) Number of beaches; (8) Number of stations; (9) Number of samples; and (10) Evolution of the quality of the beach monitoring stations according to NM 03.7.199.

The National Ports Agency is also evaluating water and sediment quality in port basins.

Flood warning system

The flood warning network is managed by the ABHs and the DGE. The warning network consists of 217 walkie-talkie radios – 54 at roadblocks, 140 at hydrological stations and 23 at rainfall stations.

Since the 1990s, the DGE has been modernizing the network and developing a remote monitoring network. The system allows for real-time monitoring and early warning. The first remote monitoring network was installed in the Ouergha basin and in the Ourika *wadi* in 1997. As at April 2021, several basins are equipped with a remote monitoring network, such as the Bouregreg, Ouergha, Ourika-Issyl, Souss and Loukkos-Martil basins. Efforts are also under way to install monitoring networks in the Haut Sebou, Zizguir-rheris, Moulouya-Kert, Neckor, Oum Er Rbiâ and the extension of the Ourika-Rerhaya basins.

Soil

Soil monitoring has been developed under the framework of the PANLCD. The main purpose of soil monitoring has thus been limited to the elaboration of a monitoring network that can guide policy to combat desertification. To this end, a network of 30 observatories and two technical centres for desertification monitoring have been established to oversee and periodically monitor changes according to selected indicators, covering biophysical and socioeconomic factors.

⁹⁴ Monitoring sites have been selected based on the number of visitors, the nature of the site (e.g., relief and shape of the shoreline) and the risks of pollution (e.g., wastewater discharges, river mouths and ports).

⁹⁵ www.statista.com/statistics/1174437/monitoring-stations-able-to-measure-bathing-water-in-morocco/.

The network of observatories covers different classes of sensitivity to desertification. The location of observatories has been established by superimposing maps of sensitivity to desertification, based on biophysical parameters and vulnerability to land degradation. The collection of data using the Mediterranean Desertification and Land Use (MEDALUS) model⁹⁶ and Geographic Information System (GIS) has made it possible to define a desertification sensitivity index for Morocco. It has also allowed for the generation of a vulnerability map per homogeneous zone with different weights attributed to each parameter, depending on the specificity of the zone.

In the framework of the PANLCD, Morocco reports on several indicators, including:

- Cost of agricultural land degradation in terms of cost of degradation related to rainfed land;
- Desertification sensitivity index;
- Land losses in tons per hectare by region;
- Impact of clearing, degradation and desertification (change in productivity, market price, benefits transfer);
- Impact of erosion on rainfed crops (change in productivity and market price);
- Impact of salinization on irrigated lands (change in productivity and market price);
- Land use;
- Water erosion rate in terms of specific erosion per area;
- Homogeneous zones for sensitivity to soil degradation;
- Areas and administrative territories of homogeneous zones;
- Percentage distribution of the surface area of homogeneous areas by class of erosive conditions, pastoral pressure and sensitivity to desertification;
- Status of soil water erosion;
- Status of wind erosion of soils;
- Surface area of degraded land as a proportion of the land surface (between 2000 and 2015) (percentage);
- Desertification and land degradation sensitivity map – Zone 6 (Settat-Casablanca).

Information (or metadata) sheets have been elaborated for certain indicators, covering overgrazing index, erosion index, land use, sensitivity and vulnerability to

desertification. These sheets present the procedures and methods for data collection.

Additionally, some laboratories are dealing with soil fertility in Morocco. The Modern Analysis Laboratory of the National School of Agriculture of Meknès carries out analysis in relation to the use of fertilizers. The Analysis Laboratory of the National Institute of Agronomic Research (INRA), in partnership with the Hassan II Agronomic and Veterinary Institute and the National School of Agriculture of Meknès, has developed soil fertility maps for Morocco.⁹⁷ The Laboratory of the Hassan II Agronomic and Veterinary Institute develops soil and crop fertilization solutions. However, the parameters that are being monitored do not include additional soil properties, such as the prevalence of nitrates and pesticides, temperatures, soil pH and light intensity.

Noise and vibration

No environmental noise and vibration monitoring is carried out in Morocco.

Radioactivity

As at April 2021, no radioactivity monitoring network is operating in Morocco. However, the country is in the process of elaborating a network. The AMSSNuR, which was established in 2014, is setting up a national radiological environmental monitoring network and has notably proceeded with the identification of national stakeholders, monitoring stations and measurement laboratories, as well as the selection of sites for the development of a national telemetry network.

Biodiversity

As at April 2021, Morocco does not monitor its biodiversity actively. However, it has taken steps to develop monitoring capacities to track the evolution of vulnerable species, notably in protected areas (chapter 11). The indicators related to biodiversity cover:

- Protected areas (by region, by protected area);
- Faunistic biodiversity (measures the number of endangered species, number of endemic species, total number of known species, among other things);

⁹⁶ The MEDALUS approach identifies environmentally sensitive areas using an environmentally sensitive area index. This index is implemented using several variables, such as physical (soil quality), environmental (vegetation quality), climatic (climate quality) and social (management quality) indicators and used to obtain an understanding of the parameters causing desertification.

⁹⁷ www.fertimap.ma/.

- State of flora (includes type: algae, mushrooms, lichens, foam, fern, phanerogams; measures: estimated number of species, number of identified species);
- Proportion of important zones for terrestrial and freshwater biodiversity in protected areas (by ecosystem type) (percentage);
- Surface area of degraded land as a proportion of the land surface (between 2000 and 2015) (percentage);
- Conservation status of endangered species in Morocco: Extinct (EX) – includes Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (seen) (V), Near Threatened (NT or LR/nt), Minor Concern (LC or LR/lc), Insufficient Data (DD);
- Impact of biodiversity degradation by region;
- Evolution of the number of plots having undergone modifications;
- Number of wetlands classified as protected areas;
- Number of wetlands under management;
- Number of wetlands;
- Area of wetlands;
- Number of Ramsar sites;
- Area of Ramsar sites;
- Number of species with a management plan (for which an action plan has been elaborated).

Forests

The introduction of a forest inventory procedure in Morocco began in 1990 and the country finished its first National Forest Inventory (NFI) in 2005. This was achieved utilizing a method based on aerial photographs combined with satellite images and statistical sampling techniques for measuring trees on the ground. NFI was revised in 2018 and its report published in 2020. Morocco has been revising its forest mapping at the national level since 2003. This operation is being carried out at an annual rate of about 1 million ha, all terrain combined (forest land and other), giving priority to forested areas.

The inventory is based on a national sampling system of 3,635 plots, based on temporary plots. Data collection is carried out on plots with variable dimensions according to the composition of tree species. The main data collected in the context of the inventory are:

- Aerial photography: the Department of Water and Forests has aerial photography covering 9,383,749 ha;
- Forest maps: the forest cover maps are available in digital and analogue formats at reference scales of 1:50,000, 1:100,000 or 1:250,000; as at April 2021, Morocco is also engaged in revising its

forest cartography with a rate of five to six maps at 1:100,000 by use of panchromatic aerial photos at 1:20,000;

- Dendrometric data and forest areas: measurement of classical dendrometric variables and data on the respective forest areas are stored in dynamic databases.

The indicators related to forests cover:

- Surface area of forest areas as a proportion of land area (percentage);
- Total forest area;
- Surface area in hectares;
- Temporary deforestation resulting from: definitive harvests, number of fires, burnt areas, forestry and groundwater formation, area treated;
- Renewal of the forest stand by: number of seedlings produced (thousands), reforestation and regeneration (provisional balance sheet), which includes reforestation, regeneration and silvo-pastoral improvement;
- Areas of forest formation;
- Forest area by region;
- Territorial distribution of overgrazing intensity;
- Forest areas mobilized for development projects.

Analytical laboratories

LNESP, under the Department of Sustainable Development, is involved in monitoring the quality of bathing water, sand, POPs and air quality. It is further involved in the National Pollution Monitoring Programme for the Atlantic Coast (ATLANTIQUE-POL) and the Programme for the Assessment and Control of Marine Pollution in the Mediterranean (MEDPOL), which covers the Telluric Pollution Monitoring Programme (National Land-based Pollution Monitoring Programme MEDPOL) as well as the National Programme for Integrated Monitoring and Assessment of Pollution of the Mediterranean Sea (National Monitoring Programme IMAP). While LNESP does not carry out monitoring of vibration and noise, it has noise monitoring equipment at its disposal. The Laboratory has three departments and two cross-functional units and is accredited as a calibration laboratory according to ISO 17025.

ONEE monitors the sustainability, safety and reinforcement of the drinking water supply in urban areas and the generalization of drinking water supplies in rural areas. As at April 2021, its Department of Water Quality Control consists of a central laboratory and 10 regional directorates with more than 73 drinking water laboratories, 44 treatment plant (WWTP) laboratories and two mobile laboratories for the characterization of wastewater and the monitoring

of WWTP discharges. Although the accreditation is not mandatory, the central laboratory and two regional laboratories (in Marrakesh and Oujda) have been accredited as calibration laboratories according to ISO 17025. Two more laboratories (in Agadir and Khouribga) are in the process of being accredited.

The Department of Water Quality Control has three laboratories that have been certified in accordance with ISO 9001-V 2008, from 27 February 2016, and a certification programme in accordance with ISO 22000 has been carried out. Two production units have been certified in accordance with ISO 22000.

The National Institute of Hygiene (INH), under the Ministry of Health and Social Welfare, is the reference body for medical and environmental biology. The INH provides technical and scientific support to various public health programmes, such as those related to tuberculosis, malaria, bilharzia, leishmaniasis, meningitis, enteric diseases, salmonellosis, sexually transmitted infections, polio, measles and influenza, and control of water and food safety. The laboratories in its network are accredited in accordance with ISO 9001 and ISO 17025.

The INRH was established by the Department of Marine Fisheries as an independent agency to monitor fishery resources. Its mission is to undertake all research activities, studies, experimental actions and works at sea or on land with the objective of developing and rationalizing the management of fisheries and aquaculture resources. The Institute has nine research centres, three laboratories and five vessels. It is accredited in accordance with ISO 9001 and ISO 17025 for all entities.

The Public Laboratory for Tests and Studies (LPEE) is a public company that provides services in the areas of water, air, soil, solid waste and sediments. The main services provided by LPEE include the sampling and analysis of water (bathing water, marine water, drinking water and wastewater), measurement of pollution flows in waterways or discharges, physicochemical and biological characterization of marine ecosystems, characterization of ambient air quality, characterization of atmospheric emissions from stacks, identification and characterization of soil pollutants (e.g., hydrocarbons and heavy metals), characterization of household and industrial waste and characterization of sediments and dredging materials. It has 10 specialized centres, 12 regional centres and

25 laboratories that have been accredited in accordance with ISO 17025.⁹⁸

4.2 Availability of information on the environment and sustainable development

Since 2011, Moroccan citizens have had a constitutional right to access information held by the public administration. Law No. 31-13 on the Right of Access to Information was adopted in 2018 and has been in force since 2020. The Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development grants every citizen the right to access environmental information. However, the access to information regime remains under development, which complicates its assessment.

Data reporting by enterprises

As at April 2021, no law obliges an enterprise operating in Morocco to publish an environmental report or a sustainable development report. However, some information relating to the environmental performance of enterprises can be found in the Moroccan Enterprise Survey. The most recent Morocco Enterprise Survey (2019) was part of a joint project of the European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB) and World Bank Group. While the Survey mainly concerns the business environment, it covers, among other things, environment-related aspects such as exposure to environmental impacts, management and the environment, environmental policy and regulation and the environmental impact of enterprises.

As at April 2021, Morocco is not reporting on SDG target 12.6 and indicator 12.6.1.

Statistical data

Statistical activities in Morocco are coordinated by the Coordinating Committee of Statistical Studies, the body for coordination and promotion of statistical studies. The National Statistics Office is under the HCP.⁹⁹

In Morocco, national accounts are prepared by the General Directorate of Statistics and National Accounts within the HCP. HCP is the main producer of economic, demographic and social statistical information. It is also responsible for establishing the national accounts and prepares studies in the domains

⁹⁸ www.mcinet.gov.ma/sites/default/files/Liste_Laboratoires%20accrédites%20NM%20ISO-CEI%2017025_Version%20du%2030.06.2020.pdf.

⁹⁹ www.hcp.ma.

of the economic situation, macroeconomic framework and forecasting. The Statistical Yearbook has a chapter on the environment that includes environmental statistics related to water quality, sewage, wastewater treatment, air pollution, soil, and forests and biodiversity.

Dedicated compendia of environmental statistics have also been compiled by the HCP in the past. More specifically, two compendia on environmental statistics were published, in 2002 and 2006; however, no new compendia have been published since then.

Regional Information System on Environment and Sustainable Development

Morocco has opted for an indicator-based system to monitor the environment and the establishment of Regional Environmental and Sustainable Development Information Systems (SIREDDs) represents a major step forward in this direction. The Department of Sustainable Development has continued to set up SIREDDs in collaboration with OREDDs since 2011. As of April 2022, all regions have their own SIREDD installed.

Each SIREDD consists of 10 modules, including on climate change and the SDGs, and contains more than 400 indicators as at April 2021. The establishment of SIREDDs faces several challenges, such as varied capacities at the regional level and the modelling and aggregation of data, which is important to facilitate the production and collection of environmental information.

To complement the SIREDDs, Morocco is also planning to create a national system of environmental information (SINE). This project is under development in the framework of cooperation with GIZ. It is expected to be available to the public end of 2022. The overall goal is to have a support and a strategic policy monitoring tool for environmental management and protection and sustainable development at the national level. The portal is expected to provide the public with reliable data on the environment.

The observatories are expected to contribute towards the monitoring of environmental indicators and reporting on the state of the environment.

Databases

Air

In terms of air quality monitoring, data are not publicly available. This means that there is no way to know the actual level of air pollution measured. It can furthermore be noted that every region has its own database; however, apart from a daily forecast for Casablanca, these are not accessible online.

Cadastres of atmospheric emissions have been carried out in 25 cities of Morocco.¹⁰⁰ However, these cadastres and updated information on emissions are not publicly available.¹⁰¹ Currently these cadastres cover the regions of Greater Casablanca, Tadla-Azilal, Fès-Boulemane, Gharb Chrarda Bni Hssen and the cities of Safi, El Jadida, Youssoufia, Tangier, Tétouan, Rabat, Salé, Témara, Marrakesh, Essaouira, Benslimane, Khouribga and Settat. The pollutants taken into account are sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon oxides (CO and CO₂), suspended particulate matter (SPM), methane (CH₄), non-methane volatile organic compounds (NMVOC), HF, NH₃, benzene (C₆H₆) and heavy metals (Pb, Cd).

The National GHG Inventory System was established under the International Climate Initiative and adopted by the Government in 2018.¹⁰² A manual for its application is available.

Water, including drinking water

Several water databases are available at various levels of administration (ONEE Water Branch; Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests; Ministry of Health and Social Welfare, ABHs and others). The DGE has started the establishment of a National Water Information System as required by Law No. 36-15 in order to ensure the integrated and participatory management of water data.

Data and information on water are spread across regional websites. This also means the production of water-relevant indicators varies from region to region. For example, for the Fès-Meknès Region, there are 436 indicators, while in the Guelmim-Oued Noun Region, there are 359 indicators; however, information on them is, for the most part, absent. Moreover, the availability of metadata varies across regions and environmental data are available only up to 2015.

¹⁰⁰ www.environnement.gov.ma/fr/cadastre-des-emissions-atmospheriques/118-theme/air.

¹⁰¹ Ibid.

¹⁰² www.4c.ma/donnees-nationales-cc?lang=en.

Photo 4.1: Addax (*Addax nasomaculatus*), Souss Massa National Park

Photo credit: Department of Sustainable Development

Since every region has its own information system, it is difficult to assess the availability of environmental data as it relates to water. This includes the availability of a relevant database on water.

Bathing water

In accordance with NM 03.7.199 relating to monitoring the quality of bathing water, the LNEBP has developed a GIS-based information system that includes a database on bathing water quality. The database covers those beaches that are subject to monitoring and provides an overview of the temporal evolution of bathing water quality. Bathing water quality monitoring data are shared publicly online on a bi-monthly basis.¹⁰³ The laboratory has also produced other digital products, including the national bathing water quality report, the national report on the quality of sand on the beaches and an analytical report on bathing water quality for each region, including a technical sheet for each beach and the compliance rate per coastal region.

Soil

Under the PMV and some projects (e.g., Morocco Fertilized Soil Map and Fertility Map of cultivated soils in Morocco), INRA, in partnership with the

Hassan II Agronomic and Veterinary Institute and the National School of Agriculture of Meknès, has developed GIS-based soil fertility maps (Fertimap)¹⁰⁴ for Morocco. The database is available in English, French and Arabic.

Desertification monitoring is supported by the Sahara and Sahel Observatory¹⁰⁵ under the long-term ecological surveillance observatories network (ROSELT). The network consists of 25 observatories across 11 countries. There are two observatories in Morocco, in Oued Mird and Issougui. The Sahara and Sahel Observatory provides information on the indicators used for monitoring desertification and the implementation of the PANLCD in Morocco.

Noise and vibration

As at April 2021, no databases are available on noise and vibration in Morocco.

Radioactivity

As at April 2021, no databases are available on radioactivity in Morocco. AMSSNuR is in the process of developing an integrated information system for the management of regulatory and control activities as related to nuclear and radiological safety and security.

¹⁰³ labo.environnement.gov.ma (Accessed 15 March 2021).

¹⁰⁴ www.fertimap.ma (Accessed 15 March 2021).

¹⁰⁵ www.oss-online.org/ (Accessed 15 March 2021).

Morocco received the International Atomic Energy Agency (IAEA) Regulatory Authority Information System (RAIS)¹⁰⁶ in 2017. This software application allows AMSSNuR to manage its regulatory activities in accordance with IAEA Safety Standards and guides, including the Code of Conduct on the Safety and Security of Radioactive Sources and supplementary guidance. The inventory system for ionizing radiation sources is a continuation of RAIS as set up by AMSSNuR with support from IAEA. The integration of the RAIS system into AMSSNuR's information system was initiated in 2018. This new system makes it possible to manage data, information and procedures related to authorizations, inspections and enforcement activities under Law No. 142-12, as well as to monitor doses received by workers and to keep the national register of ionizing radiation sources up to date.

AMSSNuR provides information on the following indicators in its annual report:¹⁰⁷

- Breakdown of authorizations granted by field and type of activity;
- Annual change in the number of inspections;
- Geographical distribution of inspection operations;
- Breakdown of inspections by type of activity and sector of activity;
- Breakdown of inspections by type of medical and industrial facilities.

Biodiversity

An online information system and database on biodiversity¹⁰⁸ have been developed under the framework of a UNEP project (GEL/2328-2716-4B54) in 2012. However, the database is not fully populated. An update study of all species is in progress. This information will then be entered into the database. Information on biodiversity is at present available via different reports, such as the national reports to the Convention on Biodiversity, books and scientific publications.

Forests

The NFI constitutes the main resource for evaluating the state of forest resources in Morocco. The inventory is based on a national sampling system of 3,635 plots, based on temporary plots. Morocco also has systems of land administration with an associated land registry under the Ministry of Justice. The National Cadastre

Department manages an inventory of geographic, economic and social information on registered parcels for which the cadastre is operational.

Pollutant release and transfer register

Morocco has been developing a PRTR since 2008. The Department of Sustainable Development has launched a second pilot project in 2014 in a continued effort to develop a PRTR. This project was, more specifically, the Inventory of Emissions and Transfers of Polluting Materials in the city of Tangier, implemented with support from MEDPOL. This pilot project has been extended to include other regions (Tétouan and Nador), based on a voluntary self-monitoring and reporting approach.

Recommendation 3.2 (d) of the first EPR requested the creation of a nationwide multi-media (i.e., covering releases to air, water and land) PRTR, which should constitute publicly accessible online inventories of pollution from point and diffuse sources. The implementation of this part of the Recommendation is ongoing and Morocco does not yet have a public PRTR. Moreover, the lack of a specific legislative and regulatory framework for reporting systems and the reporting of industrial emissions and discharges hinders the extension of the existing PRTR to the national level.

Environmental indicators and their use

The Department of Sustainable Development oversees the collection of environmental data and information and observes and monitors the state of the environment at the national level. The Department has launched efforts to develop a national and regional environmental information system. The Department, including ONEDD, is in charge of providing database services on the environment and reporting on the state of the environment. Reports on the state of the environment are produced at the national and subnational level by ONEDD and the OREDDs.

As the national statistical authority, the HCP also plays a role in relation to access to environmental information, providing public access to indicators concerning the environment, but also on mining, energy and fishing.

However, despite clear efforts to improve access to environmental information since 2014, as for the last

¹⁰⁶ RAIS is a software application developed by IAEA to assist Member States in managing their regulatory control programmes in accordance with IAEA Safety Standards and guides; www.iaea.org/resources/software/rais.

¹⁰⁷ It can be noted that the latest publicly available annual report is that of 2018 (<https://amssnur.org.ma/publication/>).

¹⁰⁸ www.biodiversite-maroc.com/biodive/accueil.do (Accessed 2 February 2021).

EPR of Morocco, no evidence has been provided that demonstrates how environmental indicators are being used to support decision-making.

Indicators and information for the SDGs

Information on development towards the SDGs and the production of relevant SDG indicators can be found in the SIREDDs. The main objective of the monitoring and evaluation system connected to the SDGs is to provide the regions with an effective instrument, shared and accessible via the Internet, to control, analyse and visualize relevant data and indicators. For this reason, information on SDG indicators under the SIREDDs are located on separate websites covering the respective regions (Fès-Meknès, Marrakesh-Safi, Guelmim-Oued Noun, Tangier-Tétouan-Al Hoceima, Beni Mellal-Khenifra, Souss-Massa, Casablanca-Settat, Laâyoune-Sakia-El Hamra, Dakhla-Oued Ed Dahab).

According to the latest diagnostic by the HCP, the national statistical system as a whole (HCP and other departments concerned) can produce 117 out of 230 SDG indicators, i.e., 51.5 per cent of the SDG indicators. HCP has set up an SDG platform and website dedicated to the SDGs.¹⁰⁹ The site contains the quantified indicators of these goals, metadata and access to the regional database.

Implementation of Shared Environmental Information System principles

The development of SIREDDs and, by extension, an integrated environmental information system in Morocco has been ongoing since 2011. As part of this process, efforts needed for coordinated assessment programmes and reporting, as well as further streamlining of environmental indicators, have been supported through two consecutive Shared Environmental Information System (SEIS) projects launched by the European Environment Agency (EEA).

The first phase of the SEIS project took place between 2010 and 2014 and the second phase (SEIS II SOUTH) between 2018 and 2019.¹¹⁰ The first phase focused on improving capacities in the field of monitoring, collection, storage, assessment and reporting of environmental data in relevant environmental authorities, including the national statistical system. The second phase was implemented jointly with the UNEP Mediterranean Action Plan (UNEP/MAP). The aim of this support mechanism was to contribute to the reduction of marine pollution in the Mediterranean by developing an environmental information sharing system that encourages the regular production and sharing of reliable environmental data.

Photo 4.2: High Atlas



Photo credit: Department of Sustainable Development

¹⁰⁹ http://plateforme-odd.hcp.ma/ODD_HCP/fr/.

¹¹⁰ <https://eni-seis.eionet.europa.eu/south>.

The work under the second SEIS project focused on developing capacities in relation to the production of indicators on municipal solid waste (MSW), household wastewater and industrial emissions. This process has generally been following the principles of the SEIS. The general objective of the second phase in Morocco was to quantify pollution flows from the sea through industrial discharges, domestic wastewater discharges and solid waste, and target the relative administrative territories (provinces and municipalities) that would be part of the collection, exchange and management of data flows and environmental information. Results from the project demonstrate that information on MSW and household wastewater is readily available and accessible across the respective regions in Morocco, while that of industrial emissions is less so. In the latter case, among other things, it was noted where relevant data were missing at the regional level, highlighting the need for further harmonization among the respective regions.

Recommendation 3.2 (a), (b) and (c) of the first EPR requested the then Ministry of Energy, Mines, Water and Environment, in cooperation with other relevant public authorities, including regional environmental bodies, and other stakeholders, to continue working towards the establishment of an integrated environmental information system that should provide relevant comprehensive, accurate and publicly accessible information on the state of the environment. The implementation is also in progress, referring, in particular, to the process of harmonizing environmental information systems across the respective regions. However, as at April 2021, no integrated environmental information system is operational at the national level and only SIREED of 12 regions are functional.

Environmental reporting, publication of environmental data, indicator-based assessment reports

The Fourth National SOER in Morocco was published in 2020. Three preceding reports were published in 2001, 2010 and 2015. It can be noted that the two most recent SOERs differ from the first two in adopting a Drivers–Pressures–State–Impact–Response (DPSIR) framework. The two most recent SOERs focused on five areas: water, soil, air and atmosphere, coastline and marine environment, and terrestrial biodiversity. They also addressed the question of waste management. The SOERs provided an overview of the evolution of the environment and development in Morocco, including environmental governance (e.g., environmental policies and the organizational,

administrative and institutional framework) as well as international agreements and cooperation. They also consider scenarios until 2030.

It is also worth noting that several regional SOERs were launched since 2009. In contrast to the national SOER at the time, these reports were produced according to the DPSIR methodological approach and focused on the socioeconomic and environmental profile of the respective region, including the environmental state and trends as well as priority actions for environmental protection. They are accessible on the websites of ONEDD and the Department of Sustainable Development, along with summaries and communication tools. The regional reports have been used in developing regional action plans on the environment. The intention is that the SIREDDs will be used to disseminate regional reports set to be produced in the future.

The 2015 National Report on Morocco between the Millennium Development Goals and SDGs reviewed the country's progress against 56 indicators. This was the fourth and last publication in the series.¹¹¹

Other reports and documents are available on the website of the Department of Sustainable Development, such as sectoral plans, bathing water quality monitoring reports and reports required under multilateral environmental agreements (MEAs).

The HCP has produced compendia of environmental statistics, but the last was published in 2006. It has also published a few sectoral or thematic studies relevant to the environment, such as forward-looking studies on energy and agriculture in 2030, or on the sustainable management of natural resources and biodiversity, but these are also outdated as at April 2021.

4.3 Legal, policy and institutional framework

Legal framework

Recommendation 3.1 of the first EPR asked the then Ministry of Energy, Mines, Water and Environment, in cooperation with other relevant public authorities, including regional environmental bodies, to draft legislation on environmental monitoring, assessment and reporting on all environmental media (air, water, soil and biodiversity), waste, noise and vibration, and radioactivity, to support national and international reporting obligations. As at April 2021, the implementation of the Recommendation is ongoing. Some works started by the creation of SIREDDs.

¹¹¹ www.hcp.ma/file/174378/.

However, no legislation addressing data quality, classification issues and monitoring has been drafted.

Air

Morocco has continued to develop a body of juridic documents that establishes health-based standards and objectives for several air pollutants since the last EPR. Legislation to protect air started to develop in 2003 with the enactment of Law No. 13-03 on Combating Air Pollution. Since then, several laws have been promulgated that relate to the monitoring of air quality, such as Decree No. 2-09-286 setting the air quality norms to be respected and the organization of air quality monitoring, and Joint Ministerial Order No. 3750-14, which established the information thresholds, alert thresholds and rules for applying emergency measures regarding the monitoring of air quality, including a number of national ambient air quality standards to protect human health. There is now also Joint Ministerial Order No. 1653-14, which sets the conditions and calculation methods for the Air Quality Index. Only the two latter decrees have been developed since the last EPR. Additional laws relating to air quality and monitoring include:

- Law No. 11-03 on the Protection and Conservation of the Environment;
- Law No. 49-17 on Environmental Assessment;
- Decree No. 2-97-377 supplementing the Decree of 24 January 1953 on the regulation of road transport and traffic (exhaust gases);
- Decree No. 2-09-631 setting the limit values on release, emission or discharge of pollutants into the air from stationary pollution sources and methods of their control;
- Decree No. 2-12-172 setting the technical requirements on waste disposal and recovery by incineration;
- Joint Order of the Minister of Energy, Mines and the Environment and the Minister of Industry, Trade and the Green and Digital Economy No. 2323.20 (7 September 2020) setting the sectoral limit values for emissions, releases and discharges of pollutants into the air from activities in the ceramics sector;
- Decree No. 2-18-74 on the National Greenhouse Gas Inventory System.

Water (surface and groundwater), including drinking water

The main development in Morocco since 2012 has been the adoption of a new Law on Water (No. 36-15) in 2016. The new Law pursues the objectives of the previous Law on Water (No. 10-95) and has

introduced reforms aimed primarily at consolidating and strengthening the management and planning of water resources. It has further strengthened relevant consultation and coordination bodies and organizations through the establishment of CBHs, as well as providing a legal foundation to diversify supply, including the implementation of water-related information systems. Additional laws relating to water use and monitoring are:

- Law No. 78-00 on the Communal Charter;
- Dahir No. 1-69-25 on the Agricultural Investment Code;
- Law No. 69-00 on State Financial Control of Public Enterprises and Other Bodies;
- Law No. 02-84 on Agricultural Water User Associations;
- Moroccan Standard NM 03.7.001. Quality of Water for Human Consumption.

Bathing water

Law No. 81-12 on the Coastal Zone provides for the regular monitoring of marine bathing water quality and classifies the beaches according to their bathing water quality.

Soil

No major legislative developments on soil have occurred since the first EPR in 2012. Dahir No. 1-69-170 of 1969 sets out basic conditions for soil protection and rehabilitation, while Law No. 11-03 stipulates that the soil and subsoil, and the wealth they contain, in limited or non-renewable resources, are protected against any form of degradation and must be exploited in a rational manner. There are no regulations on soil contamination; however, a specific law on soil is being drawn up, as at April 2021. It aims to enhance and protect the soil against various forms of degradation and pollution.

Noise and vibration

No major legislative developments on noise and vibration have occurred since the previous EPR. The main legislative documents on occupational safety and health include the Labour Code and Ministerial Order of the Minister of Employment and Vocational Training No. 93-08 of 12 May 2008 setting general and specific implementing measures relating to the principles set out in Articles 281 to 291 of the Labour Code. Dahir No. 1-03-59, promulgating Law No. 11-03, establishes the permitted sound and vibration limit values.

Photo 4.3: Lake Dayet-Aaoua, Middle Atlas

Photo credit: Department of Sustainable Development

Radioactivity

It was reported in the first EPR that a draft law on nuclear and radiological safety had been prepared. Law No. 142-12 on Nuclear and Radiological Safety and Security and the Creation of the Moroccan Agency for Nuclear and Radiological Safety and Security was adopted in 2014. A number of texts and decrees related to management and monitoring have subsequently been adopted:

- Law No. 12-02 on Civil Liability for Nuclear Damage;
- Law No. 49-17 on Environmental Assessment;
- Decree No. 2-94-666 on the authorization and control of nuclear installations;
- Decree No. 2-97-30 on protection against ionizing radiation;
- Decree No. 2-97-132 on the use of ionizing radiation for medical or dental purposes;
- Dahir No. 1-99-126 on the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Biodiversity

No major legislative developments on biodiversity have occurred since the EPR in 2012. Law No. 11-03

sets out the general provisions as related to protected areas, parks, nature reserves and protected forests. However, it does not include biodiversity monitoring. Law No. 22-07 on Protected Areas sets out the framework for the competent authority in charge of the management of protected areas, including monitoring. Other laws related to biodiversity monitoring include:

- Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development;
- Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade;
- Law No. 15-12 on the Prevention and Combating of Illegal, Undeclared and Unregulated Fishing;
- Law No. 81-12 on the Coastal Zone.

Forests

Morocco has more than 30 different laws and decrees that relate to forests and forest management, including obligations for monitoring under the respective instruments (e.g., CITES). The main legal instruments are:

- Dahir No. 1335 of 10 October 1917 on the conservation and exploitation of forests;

- Dahir of 12 September 1949 creating a forest fund;
- Dahir No. 1-76-350 of 20 September 1976 on the Organization of the Participation of the Population in the Development of the Forest Economy;
- Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade;
- Decree of 15 January 1921 on the right of passage in state forests;
- Decree of 8 September 1918 on the conditions of exploitation, peddling and sale of forest products.

Statistical data

While there is no specific legal framework that governs environmental statistics, Morocco has drawn up a new law, currently in the process of approval, in accordance with the fundamental principles of official statistics, as adopted by the United Nations.

Policy framework

Air

The PNAir covers air quality monitoring, the reduction of air emissions, the strengthening of the legal framework and communication and education on the environment. As part of reorganizing the monitoring system, air quality monitoring has also been regionalized, which implies that the regions now manage the monitoring and assessment of air quality at their level. This has had effects on the reporting on air quality issues as some regional variations have been found.

Water (surface and groundwater), including drinking water

A National Water Strategy has been in place since 2009 to strengthen Morocco's water policy. The Strategy, as with other thematic strategies concerning water management (e.g., on the environment, agriculture and industry) has been broken down into several programmes and national plans.

Bathing water

Regarding efforts to monitor bathing waters, the National Land-based Pollution Monitoring Programme (MEDPOL), the National Programme for Integrated Monitoring and Assessment of Pollution of the Mediterranean Sea, National Monitoring Programme (IMAP), the National Pollution Monitoring Programme for the Atlantic Coast

(ATLANTIQUE-POL) and the PNAM have been noted as being relevant.

Soil

The National Watershed Management Plan (covering soil erosion); the National Water Strategy; the Reforestation Master Plan (related to the stabilization and maintenance of soil fertility); the Forest Fire Prevention and Control Master Plan (aiming to reduce the pressure on forest ecosystems); the National Forestry Programme; the Course Development Strategy (linked to the reduction of pressure on forests) and the SNDD, aimed at combating land degradation), have been noted as relevant to the protection and rehabilitation of soil. Most of these efforts are indirectly related to soil monitoring. For example, under the National Strategy of Natural Risks Management, 2020–2030, a disaster evaluation and monitoring system as part of the Sendai Framework for Disaster Risk Reduction 2015–2030 will be established. This plan covers risks such as soil erosion.

Moreover, several programmes and strategies linked to ongoing efforts to combat desertification, such as the PMV, PANLCD, NBSAP and the National Plan for the Restructuring and Development of Palm Groves relate indirectly to soil monitoring as they primarily concern drought and crop monitoring.

Radioactivity

AMSSNuR launched a strategy in 2017 to upgrade the national regulatory framework on the establishment of a national nuclear security system.¹¹²

Biodiversity

The NBSAP states that biodiversity monitoring is envisaged while indicators related to biodiversity and its monitoring have already been developed. Morocco has recently completed its Sixth National Report on Biodiversity to the CBD as a prelude to a post-2020 strategy on biodiversity.

Forests

The Department of Water and Forests has elaborated a strategy that is implemented through 10-year plans (2005–2014, 2015–2024). Outputs under the strategy for the period 2015–2024 include efforts to monitor ongoing activities and develop a forest health monitoring system at the national level as part of project work supported by the Food and Agriculture Organization of the United Nations (FAO). Other

¹¹² <https://amssnur.org.ma/plan-strategique-amssnur/>.

strategic documents mention forest monitoring, such as the previous National Forestry Development Strategy, the National Strategy for Surveillance and Monitoring of Forest Health, the Forest Fire Prevention and Control Master Plan, the National Forestry Programme, the Strategy for the Conservation and Development of Genetic Resources of Cultivated Plants, and Forests of Morocco 2020–2030. Project work under the latter is part of a capacity-building plan for monitoring and evaluation, with the integration of indicators for forest and landscape restoration into the National GHG Inventory System.

Institutional framework

Air

Before 2020, the DGM was responsible for air quality monitoring. Since then, the Department of Sustainable Development is the main authority in charge of air monitoring, as well as the control and implementation of legislation on air. This is done through different programmes and relevant public institutions at the central and regional levels. For instance, the Standing Committee on Air Quality Monitoring and Surveillance was set up in 2017 by the former Secretariat of State for Sustainable Development. The Committee is chaired by the Department of Sustainable Development and consists of

representatives from several ministerial departments. Eleven air quality monitoring and surveillance committees have also been created. The LNEP, which is directly attached to the Secretary-General of the Department of Sustainable Development, is in charge of air quality monitoring and the Air Pollution Prevention Service, under its Department of Programmes and Achievements (DPR), is responsible for governance and planning.

Water

ABHs monitor water use and quality. The Ministry of Health and Social Welfare is responsible for drinking water quality control and has an important role in the development of water-related standards and laws. The Water Police is also responsible for monitoring water quality (chapters 1 and 9).

Bathing water

The monitoring of bathing water is managed by the Department of Sustainable Development and organized by the LNEP. Implementation is handled by LPEE through the Centre for Environmental and Pollution Studies and Research (CSREP). The monitoring of the Moroccan Mediterranean coast is carried out through a national network, which includes the LNEP, INRH, INH and ONEE Water Branch.

Photo 4.4: Barbary ground squirrel (*Atlantoxerus getulus*)



Photo credit: Department of Sustainable Development

Soil

The Department of Water and Forests, formerly the High Commission for Water, Forestry and the Fight Against Desertification is the main institution concerned with soil monitoring in Morocco.

Noise and vibration

No authorities are in charge of noise and vibration monitoring in Morocco.

Radioactivity

AMSSNuR is an independent agency in charge of regulating all issues related to nuclear and radiological safety and security. This competency was previously assigned to the Ministry of Energy Transition and Sustainable Development and the Ministry of Health and Social Welfare. While no monitoring activities are currently operational, the Agency oversees all activities concerning the use and promotion of nuclear energy or sources of ionizing radiation. Furthermore, future monitoring activities are foreseen as being managed by the Agency.

Biodiversity

The responsibilities for biodiversity monitoring are not established.

Forests

The Department of Water and Forests is responsible for forest monitoring, in cooperation with the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests.

Statistics

The HCP is the main producer of economic, demographic and social statistics, as well as the national accounts.

4.4 Assessment, conclusions and recommendations

Assessment

Morocco's ambition to expand its monitoring systems by 2020 was not achieved and the monitoring system remains the same as in 2014, even though targets to expand the monitoring network have now been set for 2030.

Water remains one of the most pressing challenges for Morocco. However, available environmental

information on water is dispersed across the websites of various institutions, and the production of indicators varies from region to region. Moreover, the available information remains significantly out of date. For example, the most recent reports that are publicly available are from 2015. Efforts to launch a PRTR are still ongoing and remain largely dependent on the establishment of a legislative and regulatory framework for reporting systems, including the reporting of industrial emissions and discharges.

National efforts to combat desertification are significantly interlinked with water issues. In the framework of the PANLCD, a monitoring network to guide the policy to combat desertification has been established, including the creation of two technical centres for desertification monitoring. This has resulted in a desertification sensitivity index, among other things. Soil monitoring is thus primarily geared towards addressing the sensitivity to desertification in the respective regions.

In addition to the adoption of the SNDD, Morocco has developed an NBSAP. However, no integrated environmental information system on biodiversity is in place.

As at April 2021, Morocco does not fully implement SEIS principles with regard to open access to environmental data and information. Only a limited number of environmental indicators are publicly available and they are rarely accessible online. The establishment of a national and integrated environmental database and online platform is a step in the right direction; however, as at April 2021, a national platform is still pending.

The implementation of Recommendation 3.2 of the first EPR is in progress, referring in particular to the process of harmonizing environmental information systems across the respective regions. However, as at April 2021, no integrated environmental information system is operational. Also, the lack of a specific legislative and regulatory framework for reporting systems and the reporting of industrial emissions and discharges hinders the extension of the PRTR to the national level.

Conclusions and recommendations

Integrated environmental information system

An integrated information system for environmental data that interlinks the environmental databases of all public authorities operating environmental monitoring activities is still not available as at April 2021. While the launch of the indicator-based SIREDDs

demonstrates progress since the last EPR, a national information system is lacking. Furthermore, data sharing among the SIREDDs has proved difficult due to the lack of harmonized procedures related to data collection.

Recommendation 4.1:

The Department of Sustainable Development, in cooperation with other relevant public authorities, including regional environmental bodies and other stakeholders, should:

- (a) *Promote the methodologies and procedures of the collection of, access to and protection and uniformity of environmental data and information to relevant institutions and the country as a whole;*
- (b) *Identify a harmonized set of national environmental indicators to support environmental decision-making, preferably in line with the Shared Environmental Information System principles;*
- (c) *Consolidate the governance system to ensure that relevant data and information is shared among the Regional Observatories of the Environment and Sustainable Development;*
- (d) *Design the integrated environmental information system to allow for the inclusion of Geographic Information System-based applications.*

Air monitoring

Morocco has made progress in establishing an air emission monitoring system, including the implementation of an emissions cadastre and national ambient air quality standards. However, the objectives set out in the last EPR have not been achieved. Specifically, according to the PNSQA, the number of air quality monitoring stations was to be extended to 140 automatic stations by 2020; this target has now been pushed back to 2030. It should also be noted that, although there are some examples of air pollution-related early warning systems in some local and urban areas, there are no systems for continuous and integrated monitoring and reporting of air quality data at the national level.

Recommendation 4.2:

The Department of Sustainable Development, in cooperation with the Standing Committee on Air Quality Monitoring and Surveillance and other relevant public authorities, including regional environmental bodies, should:

- (a) *Ensure that the number of automatic air quality monitoring stations will be extended to*

- 140 stations by 2030 as foreseen by the National Air Quality Monitoring Programme;*
- (b) *Develop a national and integrated air quality information system to provide up-to-date and real-time information about air quality in different cities and regions to decision-makers and citizens;*
- (c) *Create a national persistent organic pollutants (POPs) monitoring plan and develop relevant online tools to store and visualize data on levels of POPs.*

Water monitoring

Morocco has improved the water measurements of non-bathing surface waters and groundwaters through the accreditation of relevant laboratories, although accreditation is not mandatory. Moreover, the expansion of monitoring networks is under way. While progress has been made in terms of improving the water monitoring infrastructure, no national and integrated water information system is in place as at April 2021. The set of indicators recommended for assessing water quality across the respective regional monitoring systems is not harmonized among the regions.

Recommendation 4.3:

The ministry responsible for equipment and water, in cooperation with relevant public authorities, including regional environmental bodies, should develop a national and integrated water information system to provide up-to-date and real-time information on water quality issues on the regional and national levels.

Pollutant release and transfer register

Since 2008, Morocco has been trying to develop a PRTR. Efforts to date have been limited to a pilot project launched by the ministry responsible for the environment. No legislative and regulatory framework for reporting systems, including the reporting of industrial emissions and discharges at the national level, is established and, as at April 2021, the sharing of PRTR data has been limited to some regions.

Recommendation 4.4:

The Government should implement the necessary policy and practical measures to establish a publicly available national pollutant release and transfer register.

Soil monitoring

Soil monitoring has principally been restricted to the monitoring of soil salinization, soil moisture, drought

conditions and soil fertility, including the development of a desertification sensitivity index. No integrated information system is developed, and measurement results are not readily available to the public. The number of parameters that are being monitored remains limited.

Recommendation 4.5:

The ministry responsible for agriculture, marine fisheries, rural development and waters and forests, in cooperation with relevant authorities, should:

- (a) *Improve soil monitoring by including, for example, regular spatial-temporal monitoring of nitrates and pesticides to complement ongoing efforts to combat desertification;*
- (b) *Develop an integrated web-based geospatial portal to share data on soil quality.*

Radiation monitoring

As at April 2021, no functioning radioactivity monitoring network exists in Morocco. Nevertheless, AMSSNuR has started the identification of potential stakeholders, monitoring stations and measurement laboratories, as well as the selection of sites for the development of a national telemetry network.

Recommendation 4.6:

The Moroccan Agency for Nuclear and Radiological Safety and Security, in cooperation with relevant authorities, should:

- (a) *Operationalize the policies, strategies, programmes and systems established for the regulatory control of activities and facilities that use ionizing radiation sources and consequently the protection of the population, the environment and the public against the effects of such radiation;*
- (b) *Establish an integrated information system for the management of regulatory and control activities related to nuclear and radiological safety and security in order to centralize information and make it available to the authorities and the public.*

Biodiversity monitoring

While Morocco does not carry out active biodiversity monitoring, steps have been taken to develop monitoring capacities. Despite the creation of a national information system on biodiversity, no harmonized procedures related to data collection across the OREDDs exist. No governance system ensuring that information on biodiversity can be

upscaled and aggregated at the national level is established.

Recommendation 4.7:

The Government should:

- (a) *Establish an integrated programme of biodiversity monitoring;*
- (b) *Ensure that new tools are available at the national and regional levels for the environment and sustainable development to provide up-to-date information on biodiversity.*

State of the environment report

Morocco has published state of the environment reports in 2001, 2010, 2015 and 2020. Public access to data on the state of the environment remains difficult.

Recommendation 4.8:

The Department of Sustainable Development, in cooperation with relevant public authorities, should:

- (a) *Ensure that a state of the environment report is published regularly, at least every five years, and that it includes the formulation of specific actions and policy measures to be taken, and complement these reports with additional and regular publications and information to analyse and review emerging threats;*
- (b) *Facilitate the sharing of available data on the state of the environment in relevant repositories, preferably in line with the Shared Environmental Information System principles and ensure that the data become accessible to the public at the regional and national levels.*

National Forest Inventory

The forest inventory was revised in 2018 and the updated version was published in 2020. The ministry responsible for agriculture, marine fisheries, rural development and waters and forests has been modernizing applied procedures as related to forest mapping at the national level, such as revising relevant forest cartography and promoting the use of high spatial resolution satellite images in forest mapping. Furthermore, as part of modernizing the national forest monitoring system, no steps have been taken to establish permanent forest plots to facilitate continuous monitoring.

Recommendation 4.9:

The ministry responsible for agriculture, marine fisheries, rural development and waters and forests, in cooperation with other relevant public authorities, should:

- (a) Analyse different national forest monitoring systems across the Mediterranean basin to produce comparable data across countries;*
- (b) Accelerate the process of data collection on permanent plots;*
- (c) Ensure that the results of the National Forest and Land Use Monitoring System are publicly available, including by making forest inventories available on a platform in line with the principles of the Shared Environmental Information System;*
- (d) Continue to enhance organizational capacity to develop and analyse forest information, including the organization of capacity-enhancement activities to increase the use of remote sensing data for forest inventory and to strengthen national capacity in dynamic mapping.*

Noise and vibration monitoring

Morocco is not currently monitoring noise or vibrations. Nevertheless, the LNEP has equipment that would allow it to start monitoring noise pollution. No vibration monitoring equipment is currently available. No specific policies and legislation concerning noise and vibration monitoring are adopted.

Recommendation 4.10:

The Government should:

- (a) Take necessary legislative, policy and practical measures to facilitate the monitoring of noise and vibration;*
- (b) Develop a monitoring system that would allow relevant stakeholders to self-report on noise and vibration.*

SDGs national statistical system

To date, Morocco has submitted two VNRs of its progress towards the 2030 Agenda, the latest in 2020. Furthermore, the HCP has established an online SDG platform to provide data to contextualize the SDG targets and indicators at the national level. Efforts are also under way to harmonize national and regional monitoring platforms with regard to measuring and monitoring sustainable development. Nevertheless, the capacity to monitor SDGs is limited.

Recommendation 4.11:

The High Commission for Planning, in cooperation with relevant public authorities, should:

- (a) Continue investing in capacity to monitor progress towards SDGs, such as harmonizing existing national and regional monitoring platforms;*
- (b) Further develop the organizational capacity of the national statistical system to support the production of SDG indicators that are lacking.*

Chapter 5

ENVIRONMENTAL DEMOCRACY

5.1 Access to environmental information

Starting from March 2019, just one year after the adoption of Law No. 31-13 on the Right of Access to Information, all public authorities have updated their websites to afford easier access to information of public interest, including environmental matters if relevant.

Active access

The active access to information mostly includes links to data and legal and regulatory texts related to the organizational structure and missions of the relevant department, administrative procedures, calls for tenders, application for positions, programmes and publications. Links for legal and regulatory texts are always functional and comprehensive, whereas statistical and factual data are often outdated or non-existent. The webpages dedicated to access to information of governmental institutions are not harmonized. Users can find this information through the website homepage, though less experienced users may have trouble accessing the space.

Public authorities in charge of the environment

Since 2011, the Department of Sustainable Development has undertaken the overhaul of its website¹¹³ and the supervision of all its structures to provide the required information in both French and Arabic. It is expected that the information will be systematically available in Amazigh starting from 2023, although some information, including videocapsule, are already available. Five people are responsible for the website management. The upgrade of the Department's website went through the following key steps:

- 2014: Restructuring of all contents in the form of headings;
- 2016: Following the review of the Department's structure, the information dissemination approach

was amended to highlight the Department's main programmes and flagship initiatives. As at April 2021, the available information exceeds the general programme description, including progress status and tracking indicators;

- 2020: A specific space dedicated to passive access to information was organized for better ease of access by visitors and information seekers.

The website homepage is designed in such a way that visitors are directed to the available information and data organized in the following main data categories:

- Institutional and legal information: National Council for the Environment, legal and regulatory texts, partnerships and cooperation, notifications and announcements;
- Departmental services: such as the studying and monitoring of pollution, quality of the beaches, EIA, authorization requests, media, publications, documentation centre and the Hassan II Prize for the Environment;¹¹⁴
- Environmental issues: this covers state of the environment reports, air, water, soil, biodiversity, climate, the littoral and waste. For most of these, the information available focuses on a description of the theme, legislative documents, reports, assessments and national strategic and planning documents. Very little data is available on the state of the environment; the Fourth National SOER in Morocco was published in 2020;
- Awareness-raising and education purposes: "All Ecolo" information for children and schools, a media library, including videos and photos, and a space reserved for NGOs.

In addition, almost every month, the Department publishes a video of information and to raise awareness on its YouTube channel, which has 1,840 subscribers¹¹⁵ and it also has a Facebook page with 3,964 subscribers.¹¹⁶

The Department's Headquarters in Rabat has a centre for documentation which welcomes interested

¹¹³ www.environnement.gov.ma.

¹¹⁴ The Hassan II Prize for the Environment was instituted by Decree No. 2-79-152 on 16 October 1980. Since then, it has been awarded each year to a person or a public or private institution to reward an action having a beneficial effect on the environment and its protection. www.environnement.gov.ma/fr/162-prix-hassan-ii-pour-l-environnement.

¹¹⁵ www.youtube.com/channel/UCAXNgXbjL7LXnWgSGn-1aSA.

¹¹⁶ www.facebook.com/denvmaroc/ accessed on 23 March 2021.

members of the public, in particular, students and researchers. Statistics on visits are not available due to the freeze on visits during the COVID-19 lockdown.

Websites of other departments or ministries provide access to information on areas such as biodiversity,¹¹⁷ water resources,¹¹⁸ agricultural statistics,¹¹⁹ fisheries¹²⁰ and climate change.¹²¹

The website of the General Directorate of Meteorology (DGM)¹²² provides basic data related to weather (e.g., temperature and precipitation). Several paid services, such as information on climate change or natural hazards, are provided only upon request.

Some NGOs concluded that, although these websites should provide all information required, they are not comprehensive enough to make them effective. In fact, most of the data are still collected in the context of framework projects and not in institutionalized programmes, which are supposed to ensure updated and inclusive data needed for environmental monitoring and evaluation.

Active access to environmental data at regional and national levels

SIREDDs provide information and data on the environment and sustainable development for each region. Networks to collect and exchange data and information have been implemented in the 12 regions of the country with the aim of improving access to information while strengthening the support of key actors in the environmental reporting process.

Thus, SIREDDs form a decision-making platform on specific issues in each region, divided into seven to eight themes, each managed by a thematic committee and informed by almost 400 indicators.

Initially designed to cover environmental data, SIREDDs have rapidly changed to encompass all data on sustainable development. Two modules have been added: one concerns the SDGs and the second covers climate change. SIREDDs also have links to ongoing initiatives carried out with the support of the main funding partners. Moreover, SIREDDs provide several data-processing features such as simple analysis, cross

analysis, spatial-temporal monitoring and geocataloguing.

SIREDDs are supposed to provide almost 80 per cent of the data content of regional state of the environment reports. Several data sets are not yet available; for instance, Excel tables and other forms, which are posted on the SIREDD websites, are still largely empty.

At the national level, it is expected that a portal on the website of ONEDD will be developed to gather data and information from SIREDDs and aggregate the regional information in a set of indicators at the national level. While an online launch was proposed for 2021, the national system is not yet functional, at the time of writing. However, the Fourth National SOER in Morocco was elaborated and published in 2020, along with two thematic reports, one on the recovery of mining waste and the other on Morocco's efforts in the implementation of the SWIM-H2020-SM initiative for the exchange of information and data on pollution of the Mediterranean Sea.¹²³

Access to legislation on environmental matters

The official website of the Department of Sustainable Development provides access to all legislative acts on environmental matters. The website of the Ministry of Digital Transition and Administrative Reform¹²⁴ has integrated information technology into its strategy to measure the performance of the public service. It brings together a comprehensive database of legal data containing the legislative and regulatory texts concerning the Moroccan public service, such as dahirs, decrees and circulars.

Access to statistical information on environmental matters

The High Commission for Planning (HCP) is the national authority in charge of statistics, including environment-related statistics. The HCP posts on its institutional portal¹²⁵ its comprehensive statistical database (BDS). This contains a diversified range of data grouped by approximately 1,000 disaggregated statistical indicators covering varied themes for nearly

¹¹⁷ <http://ma.chm-cbd.net>.

¹¹⁸ <http://81.192.10.228/ressources-en-eau>.

¹¹⁹ www.agriculture.gov.ma/.

¹²⁰ www.mpm.gov.ma.

¹²¹ www.changementclimatique.ma and www.4c.ma/donnees-nationales-cc.

¹²² www.marocmeteo.ma.

¹²³ www.swim-h2020.eu/.

¹²⁴ www.mmmp.gov.ma.

¹²⁵ www.hcp.ma.

15 years. These indicators are of a socioeconomic, demographic and environmental nature, and come from different sources of information, such as HCP surveys and investigations, as well as statistics provided by other administrative institutions. Environmental data are related to issues including use and quality of water, soil, forests, biodiversity, air pollution and waste.

The HCP has a dedicated platform on the SDG indicators to ensure their wide dissemination. In addition to the aggregated indicators, the BDS provides access to their description. However, some data are not provided and some others are not updated.

The HCP's website has an Open Data Section dedicated to anonymized microdata of the 2014 Population and Habitat General Census, 2014 Consumption and Household Expenditures National Survey and National Time Employment Survey.

Mass-media sources of environmental information

The Department of Sustainable Development leads a programme to mobilize selected trained journalists on environmental issues, organize onsite visits to sites and populations benefiting from environmental and sustainable development projects and create regular press releases. There are about 10 journalists enlisted by the Department of Sustainable Development to be members of Moroccan official delegations and relay information on the Department's activities to the general public.

Passive access

Since 2018, the Department of Administrative Reform (DAR) of the Ministry of Economy and Finance has established several measures to support other ministerial departments in the implementation of the provisions of Law No. 31-13. In particular, the DAR published a flyer to implement the new function established by the administration to circumvent the limit imposed by the professional secrecy obligation on state officials. As a result, about 712 people have been assigned to this new function by the various ministry departments. The DAR organized two training courses (August and October 2019) for the benefit of these officers and set up an information access portal entitled Chafafiya.ma ("transparency" in Arabic).

Along with other public departments, the Department of Sustainable Development has a dedicated link to a webpage, "Access to Information", that gives direct access to the information request form, the link to

www.chafafiya.ma and a clickable list of publications and proactive information access.

The Department of Sustainable Development has an obligation to answer information requests in due time, as specified by Law No. 31-13, and must justify any refusal. The response time is 20 days, but only three days for urgent demands when people's lives and health are threatened. The Secretary-General of the Department of Sustainable Development is the ultimate manager of the process. At the regional level, the officers responsible for access to information have been enlisted with each of the Regional Environment Directorates (DREs) since 24 February 2020. Citizens have the opportunity to address their requests directly to the concerned region. The response is developed at the regional level and validated at the central level before being provided to the applicant.

Since the entry into force of Law No. 31-13, the Department of Sustainable Development has received and processed 85 requests for information, at both the national and regional levels. Requests that are not related to the activities of the Department are redirected to the relevant departments, such as those responsible for water and agriculture.

Charges

Law No. 31-13 clearly states that the right of access to information is free of charge, except when there are remunerated services in accordance with the regulatory texts in force, such as topographic maps, cadastral plans and specific meteorological data.

NGOs did not report particularly high data cost issues.

Limitations to access to information

Law No. 31-13 sets the limitations of access to information and specifies that the refusal to provide information must be motivated by the involved institutions and the administrations concerned.

Absolute exceptions include: national defence; internal and external state security; people's privacy; information of which disclosure could undermine the fundamental freedoms and rights set out in the Constitution; protection of the information sources; and information already published proactively.

According to the Ombudsperson, the interpretation of these limitations is not specified sufficiently to support a restrictive interpretation in favour of the public interest for the requested information. Jurisprudence is generated when journalists plead Law No. 31-13, which encourages them to seek solutions for

exceptions. No exception in obtaining information is established on the basis of an advanced understanding that meets the spirit of the text and not its literal interpretation.¹²⁶

5.2 Public participation in decision-making on environmental matters

The 2011 Constitution guarantees the right to public participation in decision-making relating to all development sectors. Public authorities must put in place the necessary mechanisms to ensure participatory democracy (articles 12 and 13).

In the environmental field, Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development of 6 March 2014 establishes the principle of participation in the seven framing elements of policies, strategies, programmes and action plans by any actor in the public sector (such as the Government, local authorities, public establishments and state companies).

Civil society organizations

The Department of Sustainable Development is strengthening its partnership with two key elements of civil society: local communities and NGOs. A division within the Department deals with civil society and the implementation of the related programmes concerning, specifically, the funding programme for associative projects and the NGO capacity-building programme.

The Department organizes annual regional training sessions for the local NGOs on topics related to environmental protection and sustainable development identified through a needs analysis. This capacity-building programme has benefited more than 1,500 NGOs and has enabled the emergence of many NGO initiatives in several regions.

The Department of Sustainable Development organized a civil society forum on 16 June 2014 to debate priority topical themes. Civil society organizations have underlined the success of this first forum, which brought together more than 500 environmental associations from all regions. The forum aimed to start a new area of partnership between the Department of Sustainable Development and civil society and to encourage civil society to play its role with more commitment, professionalism and

transparency. Unfortunately, the forum has not been reorganized since 2014 and civil society has noted that the conclusions of the first forum were not fully considered by the then Department of the Environment.

More than 1,200 associations working on environmental issues were registered during a census carried out by the Department of Sustainable Development in 2012. In 2021, there are more than 2,000 listed by the Department.¹²⁷ Despite this increase in number, the structure of NGOs still lacks professionalism; most of them work with volunteers and are dependent on the availability of external funding.

On the other hand, the local authorities are called upon to take into account in their territorial development plans the fundamental objectives of the SNDD.¹²⁸ In this context, the Department of Sustainable Development has signed partnership agreements with all the regions and set up several programmes to support local authorities in the area of territorial environmental rehabilitation and the implementation of environmental projects.

Funding opportunities

The Department of Sustainable Development launches an annual call for projects from civil society. In the period 2014–2018, it provided financial support to 173 projects for a total amount of 28 million dirhams. The areas of intervention are focused on preservation of natural resources, waste recovery, ecodistricts, agroecology, climate change and ecotourism. The selection criteria are rigorous and transparent; they relate to the proximity and territorial footprint of the NGOs as well as the demonstrative and replicable effect of proposed actions. The selection criteria give priority to associations that have not yet received funding and selection is based on regional representation, even if the quality of projects is lower. The selection criteria are made available on the Department's website.

In 2016, taking the opportunity of the organization of the 22nd Session of the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP22) in Marrakesh, the Department of Sustainable Development supported 40 projects on climate change issues which could raise

¹²⁶ www.mediateur.ma/fr/mshark-alsyd-osyt-almmlk-fy-tthahr-hol-msahm-alaalam-alotny-fy-alhk-fy-alhsol-aal-almaalom.

¹²⁷ Bilingual flyer (in French and Arabic) disseminated by the Department of Sustainable Development (not dated, not posted on the Department's website).

¹²⁸ www.environnement.gov.ma/fr/partenariat-cooperation/partenariat/collectivite-territoriale.

the dynamic interest and participation of civil society and the private sector.

In the same year, the Department of Sustainable Development assessed 106 community projects subsidized between 2014 and 2015. Video clips were produced on successful experiences, and lessons were documented to identify limitations.

Public participation in decision-making on specific activities (projects)

Law No. 12-03 on EIA has been revised by Law No. 49-17 on Environmental Assessment. Law No. 49-17 maintains the public inquiry as an important step in the assessment process. This allows the population concerned to make observations and proposals with regard to the possible impacts of a specific project on the environment. The summary and the report of the public inquiry are annexed to the application form to obtain the environmental acceptability decision. The environmental acceptability authorization is issued following an environmental impact study.

A new list of projects subject to EIA is expected to be published in accordance with Law No. 49-17. Pending the publication of the implementing texts of this new law, public inquiries follow the practice established within the framework of the implementation of Law No. 12-03, by Decree No. 2-04-564 of 4 November 2008. The procedure is described in a handbook that has been distributed to national and regional EIA committee members.¹²⁹ Public participation in decision-making does not cover several sensitive areas (oil and gas pipelines, water supply schemes, wind energy parks and quarries other than sand and gravel) because these areas are not included in the annex of Law No. 12-03 listing the projects subject to EIA.¹³⁰

Reports¹³¹ have pointed out the limits of the current process, in particular in terms of limited recourse to public inquiries, the lack of consideration of public comments in the EIA, the limit of public access to the registered comments, the lack of accountability in accepting or rejecting public comments and the lack of information provided on the project. In fact, public inquiries are systematically organized. However, they are not widely popularized, and the public record

contains only a partial view of the project – an information sheet and a summary. Citizens' comments are reviewed by national and regional commissions, but citizens have no feedback on whether their comments have been taken into account and the reasons behind this. Moreover, Decree No. 2-04-564 of 4 November 2008 does not specify that the public enquiry should be carried out once the EIA report is completed. This means that the public enquiry may be conducted at any time during the EIA process, even before the evaluation of the environmental impacts.

A website¹³² details the application for authorization and, in particular, the opening and the achievement of the public inquiry in the context of the EIA. However, information is only available in French, which strongly limits its dissemination for Arabic and Amazigh speakers.

Public participation in decision-making on pesticides and hazardous wastes

There is no information on public participation in processes related to pesticides and hazardous wastes.

Public participation in decision-making on strategic planning and legislation

The SGG submits all legislative texts (laws, decrees, administrative decisions and other texts) to public comment and review. The Secretariat hosts a website that brings together draft laws and regulation to inform and gather comments from the public, including with regard to the environment.¹³³

The public department that initiates the draft law and regulation must monitor received comments, synthesize them and proceed with its response. The table containing all comments received from the public through the website, as well as responses provided by the department concerned and the decision on whether comments are included in the new draft or not, is published on the same website.¹³⁴

According to Decree No. 2-08-229 of 21 May 2009, the department that has drafted the text of the law and regulation must communicate to the SGG a version considering the retained comments.¹³⁵ If substantial changes are made to the initial version of the project,

¹²⁹ www.casainvest.ma/.

¹³⁰ <https://unece.org/environment-policy/publications/environmental-performance-review-morocco>.

¹³¹ Ibid;

[www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPEP\(2020\)8&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPEP(2020)8&docLanguage=En).

¹³² <https://rabat.eregulations.org/procedure/50/29/step/164?l=fr>.

¹³³ www.sgg.gov.ma/Legislation/tabid/57/Agg2615_SelectTab/3/Default.aspx.

¹³⁴ www.sgg.gov.ma/portals/0/AvantProjet_206/Matrice_2.20.716.PDF.

¹³⁵ www.sgg.gov.ma/Portals/0/others/dec_proj_fr.pdf?ver=2012-01-04-112532-000.

the new version of the text may be subject to a new publication on the website of the SGG under the same conditions as the first time.

Drafts are posted on the SGG website for at least 15 days, during which time members of the public can post comments and proposals. Areas mentioned in the framework of the free trade agreement between Morocco and the United States of America¹³⁶ are also submitted to public review on the SGG website for at least 15 days to enable comment on the project.

This site ensures that legislative texts are transparent. However, it is not clear whether the public is fully aware about this opportunity to react on draft texts of laws and regulations and to influence the decision-making process. The site is not supported by proactive measures to encourage public participation in developing environmental laws.

Public participation in strategic environmental assessment

The 2020 Law No. 49-17 introduces SEA for all sectoral and regional policy projects, programmes, plans and schemes developed by the State, local authorities and public establishments, lists of which are fixed by regulation (chapter 1). Since the Law is recent, implementing decrees setting out the procedure for the development, review and modalities of SEA have not yet been published.

In addition, civil society has developed advocacy on strategic and planning issues, such as “the advocacy memorandum of the Moroccan Alliance for Climate Change and Sustainable Development for a climate-sensitive budget focused on sustainability and resilience to climate crises” and its “La daya de Dar Bouzouara: a natural heritage to be preserved”, to alert the public and public authorities to environmental damage and mobilize the media to relay information.

Public participation in decision-making on genetically modified organisms

As at May 2021, the legislative and regulatory framework governing GMOs is not established.

Public participation in international forums

The Department of Sustainable Development ensures the participation of civil society in official delegations to represent the country at COPs and other negotiations organized within the framework of the

implementation of multilateral environmental agreements. A delegate’s guide is developed and distributed to civil society actors to detail the issues for the country in the negotiations and helps to develop the official governmental position at the conferences of the parties. The Moroccan pavilion set up during these events constitutes a meeting place for all the delegates and Moroccan participants other than those in the official delegation (e.g., participants at side events or project presentations).

The organization of COP22 in 2016 gave a great boost in the mobilization of Moroccan civil society and the private sector to address the challenges of climate change and the Paris Agreement. As a result, coalitions of associations have been created with the training and organizational support of the Department of Sustainable Development and its development partners, leading to the launch of several programmes.

Public participation in decision-making in times of pandemic

On the website of the Department of Sustainable Development there is no information on the special provisions taken by the Department in times of pandemic. However, the website announces the conduct of virtual meetings and conferences and contains a banner to raise public awareness about waste management with regard to face masks.

Internally, the Department of Sustainable Development has set up a committee of three officials to elaborate a practical guide to COVID-19 preventative and health measures for a safe and gradual return to activity after the general containment period decided upon in March 2020 comes to an end.

Engagement of environmental NGOs

At the national level, environmental associations are members of various councils or commissions, such as the National Council for the Environment, National Council for Sustainable Development, National Commission on Climate Change and Biodiversity and National Commission on Integrated Coastal Zone Management. NGOs constitute one of the four colleges of the Climate Change Competence Centre of Morocco (4C-Morocco)¹³⁷ and actively contribute to the development of strategic and planning documents. However, these councils or commissions have a strictly advisory role. Consequently, NGOs consider that their position is not always considered in the final

¹³⁶ www.sgg.gov.ma/Legislation/ListeAvant-projets.aspx.

¹³⁷ www.4c.ma.

version of a document when it does not correspond to the position of the administration.

NGOs believe that the participation of civil society in environmental decision-making processes is still limited, although some actions were carried out to adopt participatory and inclusive approaches.

At the regional level, local authorities and associations are members of the board of directors and thematic committees of the OREDDs.

Examples of NGO engagement include participation in the elaboration of the PNL, the SNDD and other strategic documents related to climate change, or to the fight against desertification.

5.3 Access to justice in environmental matters

There are no environmental courts, although there was an experimental project that established an environmental court with specialized judges.¹³⁸ Cases related to environmental matters are handled by various courts depending on the subject of the case. The legal oversight of decisions of public authorities

that concern environmental protection is performed by the administrative litigation courts.

Courts do not have judges specialized in environmental cases or experts specialized in environmental law. They maintain lists of judicial experts in various fields, including a list of those specializing in environmental protection.

Regarding access to information matters, and in the case of a refusal of or unsatisfactory response to a data request, Law No. 31-13 sets out three steps of the complaint process:

1. Presentation of a claim to the highest hierarchical stage of the institution or concerned body within 20 working days;
2. Presentation of a claim to the Commission on the Right of Access to Information (CDAI) within 30 working days;
3. Legal action before the competent administrative court within 60 days of reception of the CDAI response, or from the expiry date of the 30-day legal deadline.

Photo 5.1: Resource Centre at the ministry in charge of the environment



Photo credit: ECE EPR Team

¹³⁸ Oasis South Programme: https://issuu.com/artpublications/docs/pos_ddc_fr_lv.

Decree No. 2-17-265 of 2017 sets out the procedures for receiving comments and proposals from users, as well as for monitoring and processing their complaints. The Government set up an online portal (Chikaya.ma, “complaint” in Arabic)¹³⁹ to facilitate the lodging of complaints by citizens, who can then ensure their follow-up. As at October 2021, the platform had registered 987,679 requests, of which 69.45 per cent were processed within an average of 44 days.¹⁴⁰ The specific data related to the Department of Sustainable Development are not available.

With regard to environmental damage, the CNEDD concerns the legal regime of environmental liability and propounds a high level of environmental protection, settled and furnished by mechanisms for rehabilitating, repairing damage and compensating for damage caused to the environment, in particular, financial guarantees where necessary.

Legal aid

According to NGOs, there is no legal aid in Morocco.

Ombudsperson (Mediator)

Law No. 14-16 of 11 March 2019 instituted the office of Ombudsperson of the King. The Office of the Ombudsperson (Mediator)¹⁴¹ is an independent institution whose mandate covers interactions between public service providers and citizens.

The main role of the Mediator is to resolve conflicts between the administration and the public. It is a constitutional body since it is a national and independent institution,¹⁴² which is tasked to defend citizens’ rights, contribute to the strengthening of the rule of law, propagate and promote the principles of justice and equity and disseminate the values of transparency and promote transparency in the management of public funds, administrations and local governments. The Office is governed by the provisions of Dahir No. 1-19-43 of 11 March 2019.

The Mediator can undertake legal action, even on his/her own initiative. Where there are complaints, the procedure must conform with the terms and conditions set out by the Law. He/she may proceed in particular when the events at issue could cause harm to nature, persons, whether Moroccan or foreign citizens, or

morals. The Mediator also has the ability to intervene at an early stage when the complaints arise from any wrong or improper act of the administration, whether an implicit or explicit decision, or an action or activity considered against the law, in particular when tainted with excess, abuse of power or against the principles of justice and fairness.

Environmental NGOs seeking justice in environmental matters

To be able to sue, an NGO must be granted “public utility” status. However, benefiting from this status is very rare. Civil society associations have reported unending, expensive and difficult legal proceedings, a lack of legal aid and limited capacities. Thus, in the event of environmental damage or risk of environmental damage, civil society alerts the population and public authorities through the media, including mass media. As a result, some NGOs consider that the right to a healthy environment is not fully established in Morocco, despite the fact that it is enshrined in the 2011 Constitution.

More generally, these NGOs think that environmental democracy is not yet fully acquired. Many NGOs call for Morocco to accede to the Convention on Public Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). Accession to the Aarhus Convention would be in line with Strategic Orientation No. 6 on Governance of the Mediterranean Strategy for Sustainable Development (MSSD), which provides Flagship Initiative 6.2.3, to “Encourage the adoption and implementation of the Aarhus Convention on public access to information, public participation in decision-making and access to justice in environmental matters”¹⁴³ with the target of reaching two thirds of Mediterranean countries by 2025. To implement this initiative, a project is being launched under the European Neighbourhood Initiative (ENI). It is a capacity-building project for the South and East Mediterranean countries, in which Morocco is included.¹⁴⁴

¹³⁹ <https://chikaya.ma/>.

¹⁴⁰ <https://chikaya.ma/?page=reclamation.Statistiques>, accessed 11 October 2011.

¹⁴¹ www.mediateur.ma/fr/filecategory/3?Rapports%20Annuels.

¹⁴² www.mediateur.ma/fr.

¹⁴³ https://wedocs.unep.org/bitstream/handle/20.500.11822/27100/19wg456_4_eng.pdf?sequence=1&isAllowed=y.

¹⁴⁴ https://wedocs.unep.org/bitstream/handle/20.500.11822/27100/19wg456_4_fre.pdf?sequence=2&isAllowed=y.

5.4 Legal, policy and institutional framework

Legal framework

Law No. 31-13 on the Right of Access to Information, which entered into force one year after its promulgation by Dahir No. 1-18-15 of 22 February 2018, fulfilled the willingness to ensure the “access to information to all citizens” guaranteed by the 2011 Constitution. It also fulfilled Recommendation 3.3 of the first EPR, which advocated accelerating the drafting of the law on public access to environmental information and promoted its adoption by Parliament, in order to implement provisions of the Constitution related to access to environmental information. Law No. 31-13 lists the information to be published without explicitly citing environmental data. Indeed, the bullet point related to “economic and social statistical data” does not mention “environment”, which should have given a sense of sustainability. CNEDD strengthens this right in the context of the environment by granting to each citizen the right to have access to reliable and relevant environmental information.

Law No. 12-03 and Law No. 49-17 are the two main legal acts that regulate public participation in decision-making on environmental matters. Law No. 12-03 stipulates that, “where a complaint is filed before the competent court against an authorization or a decision to approve a project and based on the absence of the environmental acceptability decision, the court orders, urgently, the cancellation of the authorization or the contested decision as soon as this absence is observed”.

At the regional level, Organic Law No. 111-14 on the regions, Organic Law No. 112-14 relating to prefectures and provinces and Organic Law No. 113-14 related to municipalities concretize the goodwill to establish a decentralized direct democracy. They engage councils of local authorities to set up participatory mechanisms for dialogue and consultation to promote the involvement of citizens in the development and monitoring of regional, provincial, prefectural and municipal action plans. In this regard, Decree No. 2-16-299 (regions), Decree No. 2-16-300 (prefectures and provinces) and Decree No. 2-16-301 (municipalities), all published in Official Bulletin No. 6562 of 20 April 2016, relate to the elaboration of development programmes and plans to integrate the environmental dimension to ensure

sustainable development during their development and implementation. All local authorities must thus integrate the environmental principles and objectives set by the legislator in their planning programmes.¹⁴⁵

Gender

The laws governing citizen participation in environmental governance do not generally underline specific provisions to promote the participation and involvement of women; they “remain gender neutral without making any distinction between women and men or level of duties nor even at the level of the obligations which concern them”.¹⁴⁶

The decrees establishing the National Commission on Climate Change and Biodiversity (No. 2-19-721 of 27 April 2020), organizing the National Commission on Sustainable Development (No. 2-19-452 of 17 July 2019) and concerning attributions and functioning of the National Committee and the Regional Environmental Impact Assessment Committees (No. 2-04-564 of 4 November 2008), do not specifically mention the representation of women on those bodies.

In addition, it is worth mentioning that Law No. 31-13 on the Right of Access to Information is gender neutral in the rights of the public to access information. Likewise, Decree No. 2-04-564 setting out the procedures for organizing and conducting the public inquiries related to EIAs does not provide specific guidelines to promote the consideration of gender in the process, nor does it encourage women to participate.

Access to justice in environmental matters

Law No. 11-03 on the Protection and Conservation of the Environment gives “the right within 90 days, after damages notification, to any physical person or corporation suffering prejudice due to ejection or emission of material, sound, vibration, ray, heat or odour which have caused damages to his health or own properties, to ask the administration to start to investigate. The results of this investigation are communicated to the complainant”. Similarly, Law No. 12-03 on EIA gives any physical person or corporation qualified to act in this case the right to go to Court.

¹⁴⁵ S. Hamdaoui, “Droit à l’environnement et participation au Maroc”, *Revue juridique de l’environnement*, vol. 43, 2018/3, pp. 565–583.

¹⁴⁶ Internal report of the Department of Sustainable Development on gender issues (not dated and not posted on the website).

Photo 5.2: Public awareness-raising – the Caravan on environment and sustainable development in action



Photo credit: Department of Sustainable Development

Law No. 13-03 of 2003 on Combating Air Pollution allows any physical person or corporation having suffered prejudice from any emission of materials into the atmosphere, within 90 days after damages notification, to ask for investigation through the appropriate administrative authority. This demand must be documented by medical or technical expertise. The results are communicated to the complainant within 60 days.

The jurisprudence of the Court of Cassation maintains that the cause of prejudice must be documented by a physical damage test.¹⁴⁷ Thus, a physical or moral person has the sole recourse to charge the administration when damage is suffered and only the administration has the right to initiate legal proceedings.

An online specialized magazine (box 5.1) reported a judicial case in which a complaint was filed with the court of first instance by a group of citizens. However, it was impossible to find the reference documents or to contact the concerned public departments to specify

the references of the procedure and identify other such cases. NGOs did not appear to be aware of this case and did not report similar cases.

Policy framework

The CNEDD and the SNDD are the reference documents in which, at each specific strategic level, the essential role of civil society in the implementation and monitoring of public policies is underlined.

In 2018, Morocco joined the Open Government Partnership (OGP) through the Ministry of Digital Transition and Administrative Reform, which initiated the process of co-creation in which the Government and civil society have defined commitments to foster transparency, accountability and inclusion. Public participation then became the priority of the 2018–2020 Open Government Partnership – Morocco Action Plan (box 5.2).¹⁴⁸

¹⁴⁷ juricaf.org/recherche/+facet_pays:Maroc.

¹⁴⁸ www.opengovpartnership.org/members/morocco/.

Box 5.1: Judicial case on environmental and health protection

On 7 March 2018, the Court of Appeal of Tétouan upheld the judgment issued by the Court of First Instance in Chefchaouen on 12 April 2017 in the case concerning the installation of mobile phone antennae in residential neighbourhoods. The case had previously engaged public opinion in Morocco and formed the focus of disputes between telecommunication companies and a number of civil society associations and human rights activists.

On 24 October 2016, a group of Chefchaouen citizens filed a lawsuit with the Court of First Instance in Chefchaouen, stating that Maroc Telecom intended to install a mobile phone receiver on the roof of a house next to their residence. They added that it was proven that these devices emit magnetic radiation that causes serious damage to the health of those near the device. They attached to their lawsuit a petition, an inspection record and academic research on damage to health resulting from telecommunications towers. Accordingly, they petitioned the Court to obviate the damage by requiring Maroc Telecom to stop the mobile phone antenna installation and dismantle the part that was already installed, as well to impose a fine of 2,000 dirhams for each day of non-compliance.

The argument adopted by the Court of Appeal was based on the following aspects:

- The precautionary principle considers that the lack of scientific certainty cannot be used in the failure to take measures to confront an activity that may lead to serious and irreversible environmental harm.
- The application of the precautionary principle is found in several international agreements. The principle is referred to in the Rio Declaration of 1992 and before it in several international agreements, such as the Barcelona Treaty in 1978 relating to the protection of the Mediterranean Sea from marine pollution, the 1979 Geneva Convention relating to the reduction of carbon dioxide, sulfur and nitrogen projectiles, the 1985 Vienna Convention relating to the protection of the ozone layer, the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, the 1989 Pal Convention on Hazardous Waste, the 1993 Paris Convention on Preventing the Production, Stockpiling and Use of Chemical Weapons and their Destruction, as well as the 2001 Convention on Biological Diversity and the United Nations Convention to Combat Desertification.
- The moral harm to the population as a result of the anxiety caused by living in the electromagnetic radiation field. It was concluded that the damage was present, given these stations were directly above homes or only a few metres away. This would have had a negative impact on a person's psyche due to the constant feeling of apprehension, fear and anxiety for the person and their children as a result of continuous living in a field of electromagnetic radiation.

These arguments are quite unusual in a Moroccan court.

Source: Anas Saadoun, "The most prominent judicial rulings in Morocco – 2018: (2) Important provisions to compel public administrations to implement judicial rulings", Legal Agenda, 19 April 2019. <https://legal-agenda.com/>

In terms of open data, in 2009, Morocco instituted the "Digital Morocco 2013" strategy. In 2014, Morocco set up the data.gov.ma platform governed by a Steering Committee chaired by the SGG and bringing together all the Secretaries-General of ministerial departments. The process of supplying data to the platform worked well until the end of the 2013 strategy. In 2016, the "Morocco Digital 2020" strategy revived the momentum and consolidated it with a new, appropriate governance structure in connection with the National Information Technology Council, which, from 2015 to 2017, worked on the elaboration of Law No. 31-13.

There is no policy document related to environmental democracy as such, nor to access to information, public participation in decision-making or access to justice in environmental matters. Access to information and public participation to decision-making are implemented mostly through the legal framework.

However, it is worth noting that "economic, social, cultural and environment rights" is one of the four focus areas of the National Action Plan for Democracy and Human Rights (2018–2021) which was adopted by the Government Council on 21 December 2017. Sub-area VI, "Integrated environmental policy", identifies 26 measures (Nos. 184–210) to meet the general objective to "adopt an integrated environmental policy with good governance" and achieve the specific objectives, which are to: implement the SNDD; mainstream the environmental dimension in public policies and sector-specific programmes; mainstream sustainable development; preserve biodiversity; fight against desertification and consider climate change; and establish a legal framework for environmental liability and control mechanisms. Measure No. 210 encourages the "[education] of magistrate and judicial and environmental police in the field of environmental rights".¹⁴⁹

¹⁴⁹ <http://didh.gov.ma/en/publications/national-action-plan-democracy-and-human-rights-2018-2021/>.

Box 5.2: 2018–2020 Open Government Partnership – Morocco Action Plan

The Action Plan identified 24 commitments, including 18 for the executive power and six for parliament. Among the 18 commitments for the executive power, six are directly related to the right of access to information.

The first four commitments cover the strengthening of access to information by raising public awareness on the right of access to information, the designation and training of information officers at the level of administrations and public institutions, the establishment of administrative entities in charge of archives and the strengthening of the publication and reuse of open data.

The fifth commitment is specifically linked to the establishment of an environmental data sharing system for the purpose of institutionalizing regional networks and data exchange networks, as well as providing the public with a dynamic regional platform dealing with environmental and sustainable development data. This commitment aims to strengthen and refresh the OREDDs in terms of data management and sharing environmental information with partners and the public.

The sixth commitment is related to the implementation of the transparency portal, Charaka.com (“partnership” in Arabic), which was launched in 2017 by the Minister Delegate to the Head of Government in charge of Relations with Parliament and Civil Society. This portal aims to increase transparency and good governance of the public funding system allocated to associations. It provides data and information on projects financed by public funds. The start-up phase was not conclusive due to the lack of support from other public actors in the publication of information on the portal. So far, the portal is not available, and it was thus not possible to check funding opportunities of the Department of Sustainable Development.

The second action plan for the period 2021–2023 was drawn up between January 2020 and June 2021. The development process is based on the principle of co-creation¹ and involved all actors and stakeholders. Ten events were organized on the 10 themes proposed at the start of the process.² The 232 proposals collected were submitted for public consultation on an Internet platform. The process resulted in 22 commitments across five axes.³

Source: Open Government Morocco, National Action Plan 2018–2020.

Notes:

¹ www.gouvernement-ouvert.ma/co-creation-3.php?lang=fr.

² Participatory democracy, open justice, integrity and the fight against corruption, access to information, gender equity, budget transparency and tax fairness, inclusion and territorial equity, innovation and digital governance, environment and access to natural resources, quality of public services. www.gouvernement-ouvert.ma/themes.php?lang=fr.

³ Participatory democracy, open justice, equality and inclusion, citizen participation, open local authorities. www.gouvernement-ouvert.ma/projets-engagements.php?lang=fr.

The implementation plan that had been foreseen in the National Action Plan for Democracy and Human Rights (2018–2021) is no longer available.

Institutional framework

In accordance with Law No. 31-13, all ministerial departments, including the Department of Sustainable Development and its decentralized administrations, designated an official and his or her alternate in charge of passive access to information.

Ministry of Energy Transition and Sustainable Development

The Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development and its subordinated bodies are in charge of providing information on environment-related issues. In addition, the Department of Sustainable Development supplies technical support to local authorities through a capacity-building programme on fields related to the operationalization of the SNDD at a territorial level. In each region, an annual workshop

is organized for representatives of regional, provincial and municipal councils, providing them with a set of methodological tools and the technical support necessary to raise their awareness of the environmental dimension of matters they deal with.

In 2015, the National Environment Observatory became ONEDD. Each region has an OREDD. Following the policy of decentralization of environmental information management, SIREDDs were created. SIREDDs are designed as platforms to support decision-making processes and policy design to match the public’s needs and expectations. The website of ONEDD is expected to evolve towards a national portal that provides environmental indicators at the national level. The process started in 2018 in three regions as a bilateral funded project and was extended to other regions with funding from the State budget. SIREDDs are defined and developed through a participatory approach that involves all the regional stakeholders.

Governance of the SIREDDs is under the chairmanship of the regional *wali*, who signs the

corresponding gubernatorial orders and ensures regional commitment. Three or four people are assigned to manage a SIREDD in each OREDD. The institutionalization of the system under the highest regional authority made it possible to involve all regional sustainable development stakeholders in the phase of defining and setting up the system. However, after this project phase, some key stakeholders who hold data and information are not sufficiently involved to ensure that the system is regularly populated and updated. This compromises the SIREDDs' operationalization and their usefulness as a platform for exchange and multi-stakeholder consultation.

Photo 5.3: Judicial authorities, Rabat



Photo credit: ECE EPR Team

On 15 April 2019, the Department of Sustainable Development set up an Archive and Access to Information Committee, which is chaired by the Secretary-General of the Ministry and is composed of all the departmental Directors-General. The Committee is expected to define the Annual Action Plan and support the Access to Information Officer in the fulfilment of his or her mission. As at May 2021, the elaboration of the Annual Action Plan is still in progress.

The achievement of SDG 16, in terms of governance and institutions, does not exceed 64.2 per cent, on average.¹⁵⁰ The 2020 Voluntary National Review of the implementation of the SDGs in Morocco notes that “despite the progress made by the country, the challenges remain, in particular, in terms of the establishment of totally independent and more transparent justice of inclusive decision-making and resolution of issues related to the exercise of fundamental freedoms and human rights in the context of new information and communication technologies, as well as those induced by terrorism”, but no data were available on SDG targets 16.3, 16.7 and 16.10 as they relate to the environment.

SDG 12 is specifically addressed by the Department of Sustainable Development through an awareness-raising and support programme on green economy and product labelling.

Ministry of Industry and Trade

Under the supervision of the then Ministry of Industry, Trade and Green and Digital Economy, the Digital Development Agency was established in 2017 by Law No. 61-16. The Agency is expected to ensure the implementation of the country's digital development strategy and promotion of digital technology tools and their use by citizens. As a catalyst for the country's digital transformation, the Agency is leading four flagship programmes, one of which is the “SMART Government” programme. It concerns the digital transformation of the government administration and the development of digital public services, management of service interoperability, integration and connection among the authorities or organizations concerned and technical standards for digital products and services. It aims to set up a unique, evolving, multichannel citizen portal, allowing the aggregation and dematerialization of administrative services to make it possible to centralize information from all public administrations (ministerial departments, public organizations, local authorities) intended for citizens. As at April 2021, the portal is not functioning.

Ministry of the Economy and Finances

To implement Law No. 31-13 and to harmonize the collection and dissemination of data to make it accessible to the public, the Ministry of the Economy and Finances defines a common procedure for all departments and establishes monitoring and implementation rules. In particular, it has drawn up a guide entitled “The Right of Access to Information:

¹⁵⁰ www.unsouthsouth.org/wp-content/uploads/2021/03/Agenda-2063-and-SDGs-Implementation-in-Africa.pdf.

Guide to Law No. 31-13”,¹⁵¹ as well as several administrative circulars to organize both active and passive free access to public information. Ministerial departments comply with the proactive publication measures stemming from the new regime, providing for maximum disclosure of information by all possible means of publication, particularly electronic ones.

Other

Law No. 31-13 established the Commission on the Right of Access to Information (CDAI).¹⁵² Among its several attributions, it is responsible for ensuring the proper exercise of the right of access to information, providing advice and expertise for applying the provisions of Law No. 31-13 as well as on the proactive publication of information held by the institutions and bodies. The Commission receives complaints lodged by requesters for information and does everything necessary to rule on them, by carrying out inquiries and investigations and making recommendations in this regard.

The Commission is chaired by the President of the National Commission for Protection of Personal Data, established by Law No. 09-08, promulgated on 18 February 2009. It is comprised of nine members, including a representative of one of the associations working in the field of the right of access to information, appointed by the Head of Government.

The members of the Commission are appointed for a period of five years, renewable once.¹⁵³

Since its establishment, the CDAI has carried out awareness-raising, information and promotion activities for the effective implementation of the Law.

In accordance with Laws No. 111-14 and No. 112-14, a standing committee on issues regarding sustainable development at the regional, provincial and prefectural levels has been set up for each region. In addition, the national and local authorities can organize public debates around environmental issues with citizens. Conclusions and perspectives are used in the development of policies and projects relating to the environment and sustainable development.

Photo 5.4: The Bus of the Society for the Protection of Animals and Nature of Morocco providing transport for members of the association during veterinary, education and awareness campaigns



Photo credit: Department of Sustainable Development

¹⁵¹ www.oecd.org/gov/open-government/Guide%20DAI.Final.VFr.pdf.

¹⁵² www.cdai.ma/.

¹⁵³ www.ilo.org/dyn/natlex/docs/ELECTRONIC/107094/131706/F-985611108/MAR-107094.pdf.

Decree No. 2-08-229 of 21 May 2009 establishing a procedure for the publication of legislative and regulatory texts propounds, in article 4, an interministerial commission chaired by the Secretary-General of the Government with the participation of representatives of the relevant departments concerned with projects. This commission must assess whether the project concerns one of the sectors or areas referred to in article 1 of the Law.¹⁵⁴ Civil society is not represented on this commission.

Funding

There are no specific provisions to fund environmental democracy measures.

5.5 Assessment, conclusions and recommendations

Assessment

The Department of Sustainable Development has made some progress on two dimensions of environmental democracy: public access to information and public participation in decision-making processes. However, that is not enough to ensure environmental democracy according to Principle 10 of the 1992 Rio Declaration, which defines three pillars for environmental democracy: access to environmental information, public participation in environmental decision-making processes and access to environmental justice. In Morocco, the rapprochement between civil society and the Government is limited to very few departments, including that responsible for the environment.

Recommendation 3.3 of the first EPR was implemented through an effective legislative framework on public access to environmental information with the adoption of the CNEDD and Law No. 31-13. Recommendation 5.2 (b), related to accession to the ECE Convention on access to information, public participation in decision-making and access to justice in environmental matters, is not implemented (chapter 5).

Access to information on environmental matters

Law No. 31-13 on the Right of Access to Information, along with the CNEDD, have ensured progress in making environmental information available to the public. Indeed, the Department of Sustainable

Development has made progress in the preparation and dissemination of environmental information, notably through the national and regional environmental reports. SIREDDs are also a major achievement of the Department, as an important source of environmental information to meet the needs of various stakeholders, in particular civil society and the general public.

However, several shortcomings persist. The most recent regional reports on the environment date from 2012 and the Fourth National SOER was published in 2020. Several sections of the SIREDD have not yet been populated or even updated, such as those on climate change and on the SDGs, where several pieces of data are still missing.

SIREDDs provide information on more than 400 indicators, which is too large a number to be able to evaluate synthesized information that can allow comparisons between regions and easy impact measurements. Data collection is still problematic, despite the growing membership of the various regional actors in the SIREDDs. Their mobilization around the information on these indicators is not yet fully effective.

The nomination of a person in every department to be responsible for processing public requests for information, as required by Law No. 31-13, has greatly facilitated public access to environmental information. However, many gaps persist in databases, and some data are not updated with the regularity required for effective environmental monitoring and assessment. The development of environmental status reports remains a long and quite difficult exercise because there is no portal that gives access to all indicators that are produced by the Department of Sustainable Development or by other departments and sectoral administrations. Representatives of civil society complain that the available data are not adapted to the needs of the public to ensure the monitoring and evaluation mission that is intended to guarantee public environmental action.

The limitations on access to information provided in Law No. 31-13 leave room for an interpretation that may compromise the public's right of access to information. They are not aligned with Directive 3 of the Bali Guidelines: "The grounds for rejection must be interpreted restrictively in order to take into account

¹⁵⁴ The sectors and areas referred to in Article 1 are those contained in the free trade agreement signed between Morocco and the United States of America and which include the environment.

the interest that the disclosure of the requested information would present to the public".¹⁵⁵

Public participation in decision-making on environmental matters

Despite important improvements, the typology of environmental associations remains roughly characterized by a lack of professionalism, with a great majority of them functioning mainly on a voluntary basis, with little administrative structure, and they are still heavily dependent on external funding.

The participation of environmental associations is limited to consultation on issues through representatives chosen by regional and national bodies. There are no consultation or participation mechanisms that have been institutionalized to ensure full participation by civil society. Indeed, the national civil society forum has held only one meeting, in 2014. The second forum scheduled in 2020 was delayed due to the health crisis linked to COVID-19.

The current procedure to establish a public inquiry for the purpose of an EIA does not meet Directives 10 and 11 of the Bali Guidelines, which ensure that all information relevant to environmental decision-making is made available to the public concerned in a timely, objective, understandable and effective manner, and that comments made by the public are duly taken into account in the decision-making process and that decisions are communicated to the public.

Access to justice in environmental matters

The right of access to justice in environmental matters is reserved for the Government, as represented in its institutional organizations (e.g., basic authorities, Environmental Police, Water Police). It is very rare for a private person to contest the infringement of his or her rights. The right to a healthy environment is a constitutional right; however, citizens can apply for a legal settlement only when they have suffered significant environmental damage, and then only through an administrative procedure. The damage must be proven, and recourse is only possible through the government administration, which has the right to go to the administrative court.

Conclusions and recommendations

Public access to information on environmental matters

The technical infrastructure of databases and open access data are functional. Data collection and processing at the national and regional levels are limited.

A national information system is being defined to consolidate data from the SIREDDs and consequently, will constitute a national portal for access to environmental information. This programme constitutes a key tool for the Department of Sustainable Development by ensuring the availability, reliability and quality of environmental data in order to facilitate the preparation of environmental reports in the future.

At the regional level, not all the various actors are sufficiently mobilized in providing the data and information they possess to complete and update the SIREDDs. This may be due to insufficient awareness of the contribution of such a system to their institutional monitoring and evaluation processes.

Recommendation 5.1:

The Department of Sustainable Development, in cooperation with the High Commission for Planning and relevant institutions, should accelerate the establishment of the national portal for access to environmental information.

Recommendation 5.2:

The Department of Sustainable Development should promote SIREDDs to regional actors and stakeholders to become a reference source of information in the region, to emphasize the utility of sharing data and information and allow greater support from actors in collecting data and posting information.

Public participation in decision-making on environmental matters

The Department of Sustainable Development has made great strides in mobilizing civil society around the country's environmental issues. A fruitful dialogue between the ministry responsible for the environment and environmental associations is established through their participation in various commissions, committees and official delegations. NGOs benefiting from capacity-building programmes and project

¹⁵⁵ Guidelines for the Development of National Legislation on Access to Information, Public Participation and Access to Justice in Environmental Matters, UNEP Governing Council in Bali, UNEP/GCSS.XI/8, 3 December 2009. https://wedocs.unep.org/bitstream/handle/20.500.11822/20354/K0953727.F_GCSS_XI_8.pdf?sequence=8&isAllowed=y.

financing implemented by the ministry responsible for the environment are selected in a transparent manner on the basis of well-defined criteria, which is duly shared on the ministry website. However, the NGOs still consider that they are not fully involved in the decision-making processes at the national, regional and local levels. Laws and provisions are, for the most part, gender neutral.

The civil society forum can be a mechanism of dialogue and consultation to encourage civil society to become a true partner of co-construction and overcome its bystander positioning. Indeed, other government departments are struggling to involve civil society in their sectoral strategic decision-making processes, while the ministry responsible for the environment does so in a methodical manner.

The participation of civil society in projects and strategies is not effective if NGOs do not have sufficient analytical skills and capabilities to give a relevant technical opinion.

Recommendation 5.3:

The Government should urge the amending of the regulatory texts related to the implementation of the Law on Environmental Assessment and public survey by ensuring:

- (a) *The strengthening of public participation;*
- (b) *That comments from the public are taken into account;*
- (c) *The definition of measures to be taken to ensure better consideration of gender in these processes.*

Recommendation 5.4:

The Government should ensure that:

- (a) *The Department of Sustainable Development reactivates the national and regional civil society forums to strengthen public participation at the national and regional levels;*
- (b) *All relevant sectoral government departments are involved in public participation in decision-making on environmental matters;*
- (c) *The participation of civil society in various structured dialogues, consultations and development of policies, strategies and national programmes is enhanced;*
- (d) *The ministry responsible for the environment's capacity-building programme is strengthened to benefit NGOs and to promote their professionalism and technical capabilities.*

Public access to justice on environmental matters

Although Law No. 31-13 on the Right of Access to Information shows an improvement on the road to participatory democracy, access to environmental justice is still difficult in Morocco. Environmental associations and the general public are not yet in a position to sue for environmental damage. Very few associations have the legal status of a public utility, which would allow them to file a claim, and the procedures are too complicated and too costly.

The National Action Plan for Democracy and Human Rights (2018–2021) adopted by the Government Council in 2017 identified a number of measures that aim to establish a legal framework for environmental liability and control mechanisms, as well as to improve environmental justice. However, these measures are not yet achieved.

Recommendation 5.5:

The Government should develop an Action Plan in order to achieve the 26 measures provided in Sub-area VI, "Integrated environmental policy", of the National Action Plan for Democracy and Human Rights (2018–2021), especially measures that aim to strengthen access to justice.

Environmental democracy

Morocco's achievements on the road to environmental democracy are important in terms of the two pillars of access to environmental information and public participation in environmental decision-making. They deserve to be assessed to identify gaps and strengthen weaknesses. The Aarhus Convention is widely accepted to be the leading example of implementation of Principle 10 of the Rio Declaration.

Recommendation 5.6:

The Government should:

- (a) *Assess the country's achievements in strengthening environmental democracy;*
- (b) *Carry out a forecasting exercise within the Mediterranean Action Program within the framework of the flagship initiative of the Mediterranean Strategy for Sustainable Development relating to accession to the Aarhus Convention in order to identify the measures to be taken to complete the prerequisites for joining the Convention;*
- (c) *Take advantage of civil society advocacy for accession to the Aarhus Convention to initiate a dialogue at the governmental level aimed at advancing the accession.*

Chapter 6

EDUCATION FOR SUSTAINABLE DEVELOPMENT

The education system of Morocco was the subject of several reforms that began in 1999 with the adoption of the National Charter for Education and Training, passing through the emergency programme in 2009 and the strategic vision 2015–2030. The vision recommended the promulgation of a framework law, on the one hand for the implementation of its provisions, and on the other hand to ensure the sustainability of the reform, hence the adoption of the Framework Law No. 51-17 relating to education, training and scientific research in 2019. Accordingly, the country's public and private education, training and research systems encompass formal education, including school education (preschool, primary, college and qualifying secondary (lyceum)), technical and vocational education and training (TVET), traditional education, and higher education; non-formal education; and scientific and technical research institutions.

6.1 Integration of education for sustainable development into curricula

Preschool

Preschool education is offered to children from four to six years old. Public preschool education is better developed in urban areas. Rural areas traditionally use koranic schools. Private and foreign education institutions offer preschool education, though it is not always affordable to all layers of society.

Preschool education includes three types of education: traditional education, modern (private) education and public education. In the school year 2018–2019, about 800,000 children were enrolled in preschool education. The net enrolment ratio was 57.8 per cent (of which 54.1 per cent were girls).¹⁵⁶ In 2019–2020, the net enrolment ratio increased to 71.9 per cent (61.8 per cent in rural areas; 68.4 per cent were girls) with 910,428 children attending preschool education.¹⁵⁷ Such success is attributed by the ministry in charge of education to enhanced efforts to implement the National Programme for the Generalization and Development of Preschool, launched in 2018.

Preschool education is expected to incur changes in line with Framework Law No. 51-17, opening it to children from three years old and integrating it into primary education to form a primary education cycle by 2023. Education for sustainable development (ESD) – in terms of themes, competences and approaches – is not integrated into the curricula to be developed for preschool education. The successful increase in the enrolment rate makes preschool education an excellent foundation for initiating the teaching of children on issues related to environmental protection and sustainable development, to develop a strong basis for advancing knowledge in these areas during the next levels of education.

Primary school

Primary school education is obligatory for 6- to 13-year-old children. As of 2021, primary schooling is organized in two cycles. The first cycle, lasting two years, aims at consolidating and expanding the education obtained at the preschool level and ensuring equal opportunities for all children, including those coming from traditional schools and those who do not have a preschool education. During this first cycle, children are taught basic notions of environmental protection and social skills such as values of reciprocity, cooperation and solidarity. The second cycle, lasting four years, aims at advancing the development of children's skills through deepening the learning acquired in the previous cycle, particularly in religious, civic and ethical areas. Environmental protection is not explicitly emphasized as a learning objective of the second cycle. The Mohammed VI Foundation for the Protection of the Environment joined efforts made by the ministry in charge of education to integrate the SDGs into the curricula for the last two years of primary education.

The ongoing reform is expected to merge (by 2023) preschool education into the first cycle of primary education, establishing a new, expanded first cycle of primary schooling open to children from three years old. Together with the second cycle of primary schooling and the college cycle of secondary

¹⁵⁶ HCP, Les Indicateurs Sociaux du Maroc 2019 », Edition 2020, www.hcp.ma/downloads/Indicateurs-sociaux_t11880.html.

¹⁵⁷ Généralisation du préscolaire : Le Maroc poursuit sa « success-story », Hajjar El Haïti, 12 July 2021 <https://lematin.ma/journal/2021/generalisation-prescolaire-maroc-poursuit-success-story/361409.html>.

schooling, these will form the compulsory education cycle.

In the school year 2018–2019, 3,663,476 children (1,749,289 girls), including 2,026,120 (962,440 girls) at rural level, were engaged in public primary education.¹⁵⁸ Private schools had 768,753 children (367,891 girls) enrolled in the school year 2018–2019. In the school year 2019–2020, the enrolment rate in primary school reached almost 100 per cent, according to the ministry in charge of education. The rate of completion of studies also improved, from 89.7 per cent in 2018–2019 to 91.4 per cent in 2019–2020.¹⁵⁹

ESD is not integrated into the curricula for primary school education. Mainstreaming ESD into primary school education is of paramount importance, especially given the current reform of the education system in Morocco, including the development of new curricula.

Secondary school

Secondary school education, composed of two cycles, lasts six years: college secondary education and qualifying secondary education (lyceum). Secondary education is also part of the education reform currently being carried out in Morocco.

College secondary education, lasting three years, is compulsory in Morocco. This level of education includes among its objectives initiating students in the basic concepts and laws of natural sciences, the physical sciences and the environment, as well as in knowledge about geography, history and culture of their country and the world. Active discovery of social and administrative organizations at the local, regional and national levels, and knowledge of fundamental human rights and the rights and duties of Moroccan citizens, are also among learning objectives pursued by college education. Furthermore, students have the choice of initiating projects and identifying personal interests for future vocational training in the areas of agriculture, crafts, construction or services through an apprenticeship or alternative training at the end of the college cycle. Issues related to environmental and social dimensions of sustainable development are included in curricula of natural sciences, physical sciences and social sciences (history and geography, and civic education). A course on SDGs for college

students is taught at the initiative of the Mohammed VI Foundation for the Protection of the Environment in partnership with the ministry in charge of education.

In the school year 2018–2019, 1,564,913 students (725,995 girls), including 571,797 (247,125 girls) in rural areas, were enrolled in public college secondary education.¹⁶⁰ Private schools had 172,327 students (83,152 girls) enrolled in 2018–2019. In 2019–2020, the enrolment rate reached 94.2 per cent (92.2 per cent for girls) compared with 91.8 per cent (89.3 per cent for girls) in 2018–2019. The rate of completion of studies also improved, from 55.6 per cent to 61.4 per cent over the same period.¹⁶¹

Qualifying secondary education (lyceum), lasting three years, is optional in Morocco. This level of education consists of several types of training, including a short vocational training programme organized as part of a vocational qualification cycle, as well as a general and technical and vocational training programme organized in two cycles: a one-year common core cycle and a two-year baccalaureate cycle comprising two main streams (the general education stream and the technical and vocational education stream). Qualifying secondary education aims to train qualified personnel capable of professional adaptation and mastering the basic skills necessary for entry into the professions and jobs of the various production and service sectors. Issues related to environmental and social dimensions of sustainable development are typically addressed as part of the general education stream's curricula of subjects under natural sciences, physical sciences and social sciences (history and geography). The technical and vocational education stream is clustered in six departments of engineering (mechanical, electrical, civil, chemical, economic and agricultural). Although it was not possible to study each curriculum, it would be expected that at least the compulsory subjects of geography and physical sciences address issues related to environmental protection and sustainable development as a matter of course.

In 2018–2019, 916,937 students (468,547 girls) were enrolled in the public qualifying secondary cycle level, including 170,801 (81,965 girls) in rural areas. Private schools had 101,540 students (49,403 girls) enrolled

¹⁵⁸ HCP, Indicateurs Sociaux du Maroc 2019, Edition 2020, www.hcp.ma/downloads/Indicateurs-sociaux_t11880.html

¹⁵⁹ Enseignement primaire : un taux de scolarisation de près de 100% en 2019–2020, 3 June 2021 www.maroc.ma/fr/actualites/enseignement-primaire-un-taux-de-scolarisation-de-pres-de-100-en-2019-2020.

¹⁶⁰ HCP, Indicateurs Sociaux du Maroc 2019, Edition 2020, www.hcp.ma/downloads/Indicateurs-sociaux_t11880.html.

¹⁶¹ Enseignement primaire : un taux de scolarisation de près de 100% en 2019–2020, 3 June 2021 www.maroc.ma/fr/actualites/enseignement-primaire-un-taux-de-scolarisation-de-pres-de-100-en-2019-2020.

in the school year 2018–2019.¹⁶² An increasing trend was observed at the qualifying secondary cycle level, where the enrolment rate stood at 69.6 per cent in the school year 2019–2020, against 66.9 per cent a year earlier. The rate of completion of studies also improved, from 31.3 per cent to 39 per cent over the same period.¹⁶³

In addition, traditional education is part of qualifying secondary education, aiming to impart skills in Islamic studies. Morocco is continuing to ensure traditional education at all levels of education and to strengthen links with public education, while respecting the requirements of equity and quality.

According to a study conducted in Morocco in 2011,¹⁶⁴ the curriculum recommends introducing themes related to the environment into the teaching programmes of primary and secondary levels of education by integrating such themes into each subject. Environmental topics are mostly addressed in subjects of life and earth sciences, and to some extent in other subjects (geography, physics, languages, citizenship education, Islamic education). The concept of sustainable development is only explicitly present in the geography subject of college education (“Some problems constraining sustainable development”) and lyceum education (“Environmental balance and sustainable development”, “Some problems constraining sustainable development”). Social and ethical aspects are present in the social sciences curriculum, which is part of citizenship education. Values such as equity, accountability, the rights of future generations, active citizenship, democracy and the fight against poverty are implicitly referred to in these subjects. Economics is only taught in technical high schools. There is no coordination between teachers of different subjects or joint efforts to endeavour integrating ESD into their teaching.

ESD is not developed and mainstreamed into college and qualifying secondary education, in either subject curricula or vocational training. Students at both levels are learning issues related to environmental protection and sustainable development to varying degrees.

Technical and vocational education and training

Technical and vocational education and training (TVET) is offered as part of qualifying secondary education as an initial education stream. TVET is also offered as continuing training and remote training. The TVET sector is undergoing reform as part of a general reform of education in the country with a view to establishing better links between school education and vocational training, including in support of lifelong learning.

In Morocco, TVET is undergoing a process of continuous adaptation to changes in the economy of the country and demand in new professions and specializations. TVET is working on strengthening links with the economic actors, renewing and diversifying training while ensuring regular alignment with the development of professions, and including regional dimensions in training. The department in charge of TVET works in collaboration with the regional councils to diversify the vocational training offer and to increase its capacity in order to meet the demands of the competitive economy and the needs of the labour market.

In 2017–2018, 396,000 trainees were enrolled in public and private TVET, of which 19.3 per cent were in the private sector. In 2018–2019, 387,011 trainees were enrolled in public and private TVET (a decrease of 8,989 trainees from 2017–2018), including 49,646 in construction and public works, 34,750 in hospitality and tourism, 12,144 in textiles and clothing, 5,323 in arts and crafts, 4,904 in agriculture, 3,247 in transport and logistics, 789 in chemistry and plastics, 719 in maritime fishing and 193 in renewable energy.¹⁶⁵

ESD is not developed and mainstreamed into TVET at all levels and in all professions to an appropriate degree. Students enrolled at the qualifying secondary level are learning issues related to environmental protection and sustainable development as part of their one-year common core cycle.

Higher education

In 2021, the higher education system in Morocco is provided by 423 institutions, including those in the public and private sectors and those dedicated to

¹⁶² HCP, Indicateurs Sociaux du Maroc 2019, Edition 2020, www.hcp.ma/downloads/Indicateurs-sociaux_t11880.html.

¹⁶³ Enseignement primaire : un taux de scolarisation de près de 100% en 2019-2020, 3 June 2021 www.maroc.ma/fr/actualites/enseignement-primaire-un-taux-de-scolarisation-de-pres-de-100-en-2019-2020.

¹⁶⁴ Pierre Clément, Silvia Caravita. Education for Sustainable Development and student skills in secondary education. 2011 <https://hal.archives-ouvertes.fr/hal-01026073>.

¹⁶⁵ HCP, Indicateurs Sociaux du Maroc 2019, Edition 2020, www.hcp.ma/downloads/Indicateurs-sociaux_t11880.html.

executive training.¹⁶⁶ The organization of higher education is based on the principle of continuous adaptation of the various categories of training it provides to economic and social changes and considering the evolution of university systems at the international level.

The country is in the process of restructuring its higher education, through the aggregation of all post-baccalaureate components based on principles of consistency, complementarity and efficiency. The Government draws up a multi-year plan through a multi-stakeholder consultation, which is submitted for adoption to the Higher Council for Education, Training and Scientific Research. The reform foresees the creation of a renewed national network of universities and other higher education and scientific research institutions, including through the creation of integrated regional university complexes, endowed with conditions conducive to learning, training, supervision and research, as well as social, cultural and sporting services.

In 2018–2019, 911,457 students (451,135 women) were enrolled in public higher education, including 11,539 (5,100 women) in pedagogical institutions, the latter almost triple the numbers in the previous year (an increase of 7,304). The increased interest in acquiring a profession in the education sector could be linked to an increase in demand for such specialists.

ESD is not integrated into higher education through a separate course of ESD, a specialization on ESD or a dedicated department to carry out research in and develop ESD.

Teaching materials

According to the 2011 study on “Education for Sustainable Development and student skills in secondary education”,¹⁶⁷ in Morocco, school textbooks and teaching materials do not address in detail themes related to environmental protection and sustainable development. However, the notion of sustainable development and its classic definition is cited in several textbooks. For example, the social sciences textbook presents (by a diagram) the principles of sustainable development such as: “do not undermine the needs of future generations: avoid destroying and overexploiting natural resources”; “taking into account environmental efforts in urban activities, industries, communication, ...”; “guarantee equity between urban and rural areas, between current

and future generations”; and “promote and encourage the participation of all citizens in decision-making concerning the development of their regions”. The geography textbook at the qualifying secondary level refers to values of sustainable development, including: “solidarity and cooperation between individuals from the same country and between countries of the world to safeguard the common heritage (the Earth)”; “Individual and collective responsibility in safeguarding a healthy environment and natural balance”; and the concept of a “right” to a healthy environment and to sustainable development (renewable and non-renewable resources) and the need to “safeguard” these resources within the framework of sustainable development.

Morocco has been working for several decades to meet environmental challenges by embarking on a process of development and protection of its resources in order to guarantee sustainable development. Within that process, the ministry in charge of education has initiated a deep revision of curricula and education programmes at all levels of education with a view to aligning all of them with the “skills-based approach”. The education reform entails the reconceptualization of textbooks and teaching materials, which is also being considered by the ministry.

The standardized teaching materials for teaching subjects (life and earth sciences, history and geography, physics and chemistry, and technology) that refer to environmental and sustainable development issues include relevant materials on these issues. Educational material concerning renewable energies is also included in the standard educational textbooks and materials and can be purchased. For instance, the materials for the life and earth sciences include themes and chapters addressing the natural environment, nature balance, biodiversity, ecosystems and basic notions of ecology. Teachers are encouraged to develop and use posters, banners and simple tools to study flora, fauna and ecosystems.

In addition, the country is enforcing compliance with environmental standards in managing teaching materials, in particular their storage and renewal, including degraded teaching materials and expired chemical and liquid substances, to prevent their potential negative effects.

Among challenges encountered by the country is how to address cross-cutting issues in an integrated manner in textbooks, such as the introduction of a holistic

¹⁶⁶ www.enssup.gov.ma/en/statistiques.

¹⁶⁷ Pierre Clément, Silvia Caravita. Education for Sustainable Development and student skills in secondary education. 2011 <https://hal.archives-ouvertes.fr/hal-01026073>.

approach in the environment-related chapters of biology textbooks. Ensuring a teaching style whereby learners are engaged actively in analysing and discussing local issues is also a challenge. Developing materials and guidelines for alternative methods of teaching and for designing projects, and incorporating them into textbooks, would effectively support teachers' efforts.

Research and development of teaching materials on ESD and in support to mainstreaming ESD into the education system is lacking.

Photo 6.1: Educational area at ministry in charge of the environment



Photo credit: ECE EPR Team

Fostering conservation, use and promotion of local and traditional knowledge in ESD

Morocco is a country rich in local and traditional knowledge that can be harvested and used in environmental protection and conservation and in the sustainable development of the country. Such knowledge would provide a valuable contribution to the development of ESD adapted to the circumstances of each region. Mechanisms to harvest such knowledge and engage representatives of indigenous people and from rural areas in developing ESD are lacking in the country. For 25 years a radio programme

has featured the passing on of local and traditional knowledge in agriculture by a wise elder with a view to preserving ancestral know-how.

6.2 Training of teachers

Teachers and educators are trained at the Regional Centres for Education and Training.¹⁶⁸ Several cycles are available for various types of specialists, including the teacher qualification cycle for primary and secondary education levels and for education executives and administrators.

Education inspectors are prepared by the National Centre for the Training of Education Inspectors.

Initial and continuous training of school executives and counsellors engaged in education planning and pedagogical guidance, as well as of inspectors of education planning and pedagogical guidance, is provided by the Pedagogical Guidance and Planning Centres, established in 1987.¹⁶⁹

Educators and teachers who graduated between 2012 and 2020 from the Regional Centres for Education and Training include 31,237 primary school graduates, 3,576 secondary school graduates specializing in life and earth sciences and 3,147 secondary school graduates specializing in history and geography. In 2018–2019, 6,850 future teachers in secondary education (college and qualifying levels) underwent pedagogical training, including 681 specializing in life and earth sciences, 680 in physics and chemistry and 466 in history and geography.

Teachers naturally involved in ESD, especially in the environmental dimension of ESD, are those teaching subjects related to life and earth sciences and history and geography. The training of teachers does not include ESD as a dedicated subject, nor does it include an environmental education subject.

Within the “Education and training for employability” project,¹⁷⁰ a training module on “Environment, Health, Security and Social Prevention of Violence in Schools” was developed for continuous in-service training of teachers from 90 schools affiliated to the Regional Academies for Education and Training of three regions: Tangier-Tétouan-El Hoceima, Marrakesh-Safi and Fès-Meknès.

Also, the National Continuing Education Strategy, instituted by Ministerial Order No. 31-20 of 3

¹⁶⁸ www.men.gov.ma/Fr/Pages/crmef.aspx.

¹⁶⁹ www.men.gov.ma/Fr/Pages/cope.aspx and www.men.gov.ma/Fr/Pages/presentation-decret285723.aspx.

¹⁷⁰ www.mcamorocco.ma/en/project-education-and-training-employability?a=1.

September 2020 and through the regional academic continuing education plans, is expected to target the training of teachers in subjects related to ESD.

Future and working teachers, educators and administrators at all levels of education constitute the primary target groups to be trained in ESD as an urgent priority to enable the subsequent integration of ESD in their teaching and other educational activities. In Morocco in 2018–2019, there were 284,842 teachers in public schools,¹⁷¹ including:

- 38,058 (29,285 women) at preschool level, both public and private, of which 26,461 (18,445 women) teach in traditional schools, 8,143 (7,722 women) in private schools and 3,454 (3,118 femmes) in public schools;
- 134,951 (69,766 women) at primary public school level, of which 84,422 (38,592 women) teach in rural areas; 36,861 (31,939 women) were engaged in private primary schools;
- 58,890 (24,877 women) at public secondary college level, of which 21,521 (7,514 women) teach in rural areas;
- 52,943 (18,679 women) at public secondary qualifying level, of which 11,340 (3,387 women) teach in rural areas.

In addition, at the higher education level, in 2018–2019, there were 14,400 teaching personnel (3,860 women) in universities and 1,776 teaching personnel in institutes and high schools.

Compared with 2016–2017 and 2017–2018, the trend shows increasing numbers in all categories, except for the number of preschool and primary teachers in private schools.¹⁷²

To provide in-service training on ESD for the growing number of teachers could be challenging for Morocco; nonetheless, without such training, the country would not be able to achieve SDG targets 4.7, 12.8 and 13.3 by 2030. Also, the growing number of graduating teachers would need to be able to integrate ESD into their work.

Challenges for mainstreaming ESD into teacher education and in-service training, identified by the ministry in charge of education, include developing adequate teaching approaches to address the cross-cutting nature of sustainable development and to integrate into all subjects as appropriate not only environmental protection but also the social and

economic dimensions of sustainable development. Another challenge in teacher education is applying the ESD approach in teaching through promoting learners' active participation in discussion and critical thinking, promoting stronger coordination among various subjects and multidisciplinary activities, as well as jointly (teachers and learners) identifying solutions to local issues and problems and developing and implementing projects.

6.3 Training and retraining of civil servants

There is no mandatory training for civil servants organized by the ministry in charge of the environment, nor by other ministries and institutions. Staff are undertaking ad hoc and self-training related to their functions, for instance, by participating in various workshops and training courses organized in an ad hoc manner, including within the framework of national and international projects. Depending on the subject of such workshops, themes related to environmental protection and sustainable development are included to varying degrees. ESD is not included on a consistent basis in the training of civil servants.

Examples of regular in-service training include training of the officials working in the ONEE Water Branch. Each official can benefit from a minimum of three training sessions per year constituting an average of two training days. The training, provided by the training centre of the International Institute for Water and Sanitation, is organized based on a multi-year planning process complemented by an annual programme, allowing for flexibility and provision of targeted training based on the specific needs of each official. The training includes continuous training, professional development and professional training courses of varying length and substance. Short-term education programmes last from two to 10 days, induction training for new staff is done over two to 12 weeks, on-site training is carried out over one to five days, long-term training takes places from two to three years for technician training and one to two years for a master's degree, internal training is for a minimum of 10 days and technical training is undertaken in one day. In addition, training options comprise inter-company training (workshops) and training abroad (exchange of experience and capacity-development). The training includes environmental protection elements related to integrated water management. While 70 per cent of training is provided internally by a network of trainers, 30 per cent is provided by

¹⁷¹ Preschool level statistics include both public and private institutions.

¹⁷² The statistical data available does not include data on the number of teachers in private school of the secondary education (college and lyceum).

national and international experts from private training institutions.

6.4 Non-formal and informal education

Non-formal education focusses on various educational programmes, including programmes to combat illiteracy and for the Moroccan diaspora living abroad.

In Morocco, ESD and environmental education are promoted in non-formal and informal education (relevant curricula, out-of-school activities and events) to ensure basic knowledge about the environment and, most importantly, to develop the know-how, skills and attitude required to take action to protect the environment. The themes related to the environment and sustainable development in various non-formal education programmes aim to raise the awareness of students on key environment issues (knowledge, attitudes and practices), promote good practices and citizen behaviours in relation to environmental issues and promote a cultural change in favour of responsible attitudes towards the environment. The Department of Non-Formal Education of the ministry in charge of education has developed a guide on school life focused on extracurricular activities and current affairs, based on learners' personal projects. The guide includes human rights and environmental education.

The ministry in charge of education is engaging in non-formal and informal ESD and environmental education through joint action in partnership with the ministries in charge of the environment and of youth and sport, and other relevant ministries, as well as representatives of civil society – the Mohammed VI Foundation for the Protection of the Environment (Young reporters and Eco-Schools) and the Association of Teachers of Life and Earth Sciences – to strengthen existing environmental clubs in terms of material, books and educational tools and provide

training for eco-facilitators in ESD and environmental education. An example of promoting environmental education in a rural primary school is presented in box 6.1.

Photo 6.2: Wind farm models, educational area at ministry in charge of the environment



Photo credit: ECE EPR Team

In addition, the ministry in charge of the environment, being the holder of information on the environment and sustainable development, is a key public authority for raising awareness on environmental protection and sustainable development through non-formal and informal education.

Box 6.1: Essafa primary school engaging in environmental education

Essafa public primary school, located in the Mohammedia prefecture of the Casablanca-Settat Region, underwent an environmental upgrade of its premises in the period 2018–2020, including installing 44 solar panels to supply the power for classroom lighting, using energy-saving light bulbs in all its buildings, building a rainwater collection and storage system and developing green areas on the school premises, installing bins for the separate collection of waste (paper and cardboard, plastics, glass, metal, organic waste) and acquiring a rotary composting device for the garden waste.

In addition, the school upgraded its water and sanitation infrastructure. The school carries out its eco-activities by engaging the parents through the Parents Association in addition to pupils, for instance to plant trees. Moreover, it established a partnership with a private company to support its environmental activities.

Essafa school has been an Eco-School since 2015 and retains its green flag (box 6.2). It had 1,080 pupils in the school year 2021–2022. The Regional Environmental Department and the Regional Education Academy jointly support the school's efforts to promote environmental education.

The ministry does so through its Education Centre and Resource Centre, which are popular among primary and secondary school students, who visit them and participate in various events and training on different environmental themes. Since 2015, the ministry has enhanced its educational platform by partnering with local associations and universities. Moreover, the ministry has been successfully running several programmes for an environmental upgrade of rural and koranic schools and mosques. Also, the National Council for the Environment has among its specialized committees a Committee for Culture, Information, Communication and Education working on promoting environmental awareness.

The Eco-Schools programme was launched in Morocco in 2006 by the Mohammed VI Foundation for the Protection of the Environment to promote environmental education across the country (box 6.2).

NGOs conduct activities to promote environmental education and ESD as part of their work and within the framework of various projects. For instance, the World Wide Fund for Nature (WWF) is engaged in raising awareness of biodiversity-related issues. The Association “Yes Green Morocco” runs two projects related to environmental education and ESD with

support from the ministry in charge of the environment, one promoting selective sorting of waste at source, including youth training on waste separation, and the second provides youth training on green materials. NGOs identify the lack of adequate financial means as the main challenge to speeding up such activities and broadening them to a larger number of participants. Since the country hosted COP22 in 2016, and later signed the Paris Agreement, NGOs noticed an increase in political will.

More than 3,000 events and awareness-raising activities on climate change and environmental pollution were undertaken in 2016, making it a year for boosting public awareness of environmental protection and demonstrating that intensifying environmental education and ESD is possible, under the right circumstances with good political will and action.

Morocco is participating in UNESCO Green Citizens projects, which have been carried out in the country since 2016 under the “The future is green” initiative, encouraging young Moroccans to learn new skills through growing plants. Biodiversity and ESD are the two main themes of this project.¹⁷³

Box 6.2: Raising environmental awareness through eco-schools

The Eco-Schools programme covered 17 pilot schools and, over the years, has encompassed 2,500 schools. Eco-School awards, initially biennial, have been renewed annually since September 2021. At the beginning of 2021, 310 schools in Morocco had been granted an Eco-School award, at one of three certification levels, depending on the level at which a school addresses the three mandatory themes of Eco-Schools (waste management, water efficiency and energy efficiency). In Morocco, 74 schools received the highest award – the Green Flag Award (for addressing the three themes), 54 received a silver certificate (for addressing two themes) and 182 received a bronze certificate (for addressing one theme). Through this programme, the Mohammed VI Foundation for the Protection of the Environment aims to support teachers’ efforts to integrate ESD into their classes, and to raise students’ awareness about environmental issues and of the impact their behaviour has on the environment. Contrary to the usual annual fees that participating schools have to pay for participating in this programme, its implementation in Morocco is free of charge for the schools following an agreement reached between the Foundation and the headquarters of the Eco-School programme. Also, the Foundation engages the entire community of a given school in helping it become an Eco-School.

In addition to serving as the national office for the Eco-Schools programme, the Foundation is carrying out many other non-formal and informal ESD activities. Awareness-raising activities, including on marine litter and plastic-smart cities (e.g., Tangier port-city), were delivered for nearly three million school children by means of projects and initiatives. Environmental education is a cross-cutting theme in the “Sea without plastic” initiative. Education programmes include training of school principals, including on environmental education and ESD. Environmental education and ESD are often carried out as part of extracurricular activities by the Foundation in partnership with the ministry in charge of education, as well as municipalities and other relevant authorities. In addition, the Foundation is helping the ministry in charge of education to integrate SDGs into the formal curricula, starting with the two final years of primary education and a course in secondary college education. A key achievement in promoting environmental education is the creation of the Hassan II International Environmental Training Centre,¹⁷⁴ launched in 2019.

¹⁷³ www.unescogreencitizens.org/projects/the-future-is-green/.

¹⁷⁴ <https://centre-hassan2-environnement.ma/home>.

Photo 6.3: Model of solar farm, educational area at ministry in charge of the environment



Photo credit: ECE EPR Team

6.5 Research and development

The SNDD serves as a framework for R&D in the areas of sustainable development and green economy. The activities included in the Action Plan for the Ministry of National Education, Preschool and Sports, with a view to strengthening the research applied for sustainable development and green economy, include:

- Establish mechanisms for coordinating and monitoring research activities among relevant departments, particularly in the area of sustainable development;
- Increase the budget for R&D, particularly in areas related to green economy;
- Integrate sustainable development into the strategic directions of national training and research institutions;
- Strengthen R&D on innovation, alternative materials and the development of eco-materials;
- Establish mechanisms for acknowledging skills and promoting scientific and technical excellence, in particular, related to the rationalization of the use of resources and the promotion of sustainable development;
- Strengthen the cooperation mechanisms between Morocco and other countries to finance sustainable development research projects;

- Promote mobility programmes for researchers specializing in conservation and sustainable management of resources;
- Simplify the financial and administrative management procedures of national and international research funds of national higher education and research institutions.

The research carried out in the National Centre for Pedagogical Innovations and Experimentation¹⁷⁵ aims at solving didactic, pedagogical and socio-educational issues that are experienced in classrooms or between groups of students in school life in general. The research, including on ESD, is done by various research teams based on themes collected on the ground from schools biennially, following proposals by the central and regional directorates (inspectors, directors, teachers and interns) and the Regional Academies for Education and Training. Research outcomes are assessed and marked with prizes at the national level.

Research on ESD is also undertaken by the Regional Centres for Education and Training, such as scientific research within the framework of “end-of-study projects” carried out with the aim of promoting and implementing ESD. These projects began with environmental education and the teaching of ecology and were gradually opened to the social and economic dimensions of sustainable development. Regional Centres also work on producing tools and educational materials on environmental education and ESD (textbooks, library books, photo collections, tables and maps, movies and videos, CD-ROMs and online resources) and on training teachers to produce such tools by themselves using local materials.

Finally, the Regional Centres engage in research on developing and promoting teachers’ skills in environmental education and ESD. Information and data collected show that teachers have a favourable attitude towards embracing ESD, with many teachers wishing to receive additional training on environmental education and ESD. There are examples of emerging activities such as teachers organizing debates and other interactive group work with intern teachers, including initiating interdisciplinary projects related to ESD among several teachers.

Comprehensive targeted research on ESD, with a view to using its results for integrating ESD into the education system at all levels, is lacking in the country as at 2021.

¹⁷⁵ www.men.gov.ma/Fr/Pages/CNIPE.aspx.

6.6 Legal, policy and institutional framework

Legal framework

Since the first EPR of Morocco, the legal framework for ESD has seen few changes. Nonetheless, environmental education is mentioned as an objective or a means of implementation in several legal documents.

The 2011 Constitution enshrines citizens' rights to equal access to modern, accessible and quality education and vocational training. The Constitution establishes a Higher Council for Education, Training and Scientific Research as an advisory body on the development and evaluation of all public policies and issues of national interest concerning education, training and scientific research, and on the functioning of the related public authorities.

The 2019 Framework Law No. 51-17 on Education, Training and Scientific Research establishes a three-year programme for the development of laws and regulations required for its implementation. While the Law does not explicitly include ESD or environmental education, it sets out the principles, objectives and functions of the education, training and scientific research system, including to contribute to sustainable development and serve as a lever of sustainable development. The Law sets up under the auspices of relevant public authorities a permanent commission in charge of the continuous renewal and adaptation of the curricula, programmes, training and scientific research, with support from specialized working groups. Such an institutional framework provides an opportunity for establishing a working group specialized in ESD with the mandate to prepare proposals to integrate ESD into the curricula, programmes and training.

The 2014 Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development sets key objectives for state action on environmental protection and sustainable development. The Law foresees adapting the education and teaching systems, training and vocational training programmes to integrate into the curricula the requisite knowledge, know-how and life skills and foster a culture of environmental protection and sustainable development principles, as well as creating specialized disciplines on the environment and sustainable development. The Law provides the framework for civil society associations, working mainly in the fields of the environment and sustainable development, to carry out, either of their own initiative or in partnership with the State, local authorities, public establishments, and state and private

companies, awareness-raising and education actions aimed at instilling in the population respect for the environment, natural resources, cultural heritage and the values of sustainable development.

As at April 2021, no law explicitly addresses ESD.

Photo 6.4: Model of a landfill and recovery centre, educational area at ministry in charge of the environment



Photo credit: ECE EPR Team

Policy framework

National Sustainable Development Strategy

Since 2012, the main development in the policy framework is the inclusion of ESD in the SNDD as a priority for strengthening eco-citizenship, through education, awareness and communication programmes. The SNDD identifies seven actions for promoting ESD and sets four indicators to assess progress (table 6.1). The implementation of these actions is included in the Sustainable Development Action Plan of the ministry in charge of education. However, concrete activities under each action, partners, timeline and resources needed for implementation are absent from the Action Plan. Also, the four indicators to measure progress are of a quantitative nature and limited in scope, and do not reflect the qualitative aspects of ESD. Furthermore, at the global level, the country is required to report on SDG indicators 4.7.1, 12.8.1 and 13.3.1, demonstrating by 2030 the “extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment”. The four national indicators on ESD are not sufficient to enable

the country to report and fulfil its international commitment made in 2015 to achieve the SDGs. The four national indicators lack the information required to answer all four points of the global indicator on the extent of ESD integration into national education policies, curricula, teacher education and student assessment.

Another objective, assigned to the Ministry of Energy Transition and Sustainable Development, is to strengthen communication plans and programmes on sustainable development. Planned actions involve developing and implementing communication plans and programmes around various environmental and sustainable development issues, considering regional and local specificities and tailoring actions to target various stakeholders (decision-makers, elected officials, economic operators, NGOs and the media) and the population, as well as strengthening local actions by associations and local authorities. The national indicator to measure progress is the date of the launching of the development and implementation of communication plans. The qualitative (substance and effectiveness) aspects of such communication plans and monitoring progress on their implementation on the ground, as well as the effectiveness of their outputs and outcomes, are not reflected in the national indicators as at 2021.

In addition, the SNDD includes several other strategic directions, objectives and actions aimed at developing the knowledge and skills and raising awareness of issues related to sustainable development, environmental protection and climate change. These include adapting the content of training to the needs of environmental protection and sustainable development and creating green jobs, using innovation and research to transition to sustainable development

and promoting a culture of change towards a sustainable society. For example, the SNDD identifies the need to strengthen waste sorting through developing awareness modules for the youngest and carrying out communication campaigns for citizens as means to change the mindset towards a circular economy logic of waste management. The implementation of these actions is spread across relevant ministries and included in their Sustainable Development Action Plans; however, implementation activities, partners, timelines and resources are yet to be identified.

Given that, in the education sector, the SNDD sets out other key priorities, such as reforming the education system, including increasing literacy and ensuring access for all to a quality education, as well as reforming and increasing the autonomy of universities, it is crucial to ensure dedicated staff time and to make available sufficient resources for embracing ESD together with other educational activities. For instance, priority activities in the education sector are to address school dropouts, out-of-school children and the education gap between boys and girls, especially in rural areas, and the still-strong regional and urban–rural disparities in schooling. Proposed actions include enriching and modernizing the training system in educational sciences and teaching technical subjects, strengthening the selection criteria and competences of future teachers, providing in-service training for practising teachers and establishing a system of monitoring and evaluating teaching staff. The ongoing education reform is an excellent opportunity to simultaneously integrate ESD across all levels of formal education and in non-formal and informal education.

Table 6.1: National strategic objective to promote ESD

Actions	Indicators
1. Develop ESD programmes, especially for children and young people in, for example, schools, youth centres, summer camps.	1. Number of eco-facilitators trained.
2. Integrate more actively the issue of sustainable development in education programmes (primary, secondary and higher education and vocational training).	2. Number of schools engaged in sustainable development initiatives.
3. Train teachers and eco-facilitators in sustainable development issues.	3. Date of establishment of the coordination mechanism.
4. Engage schools in sustainable development initiatives to make them a space where sustainable development is applied, demonstrated and implemented (e.g., sustainable management of waste at school level and the integration of renewable energies).	4. Number of research activities on education for sustainable development.
5. Carry out educational activities and provide pedagogical assistance adapted to ESD of children and young people.	
6. Promote research in the field of ESD.	
7. Establish a coordinating mechanism for ESD programmes.	

Source: National Sustainable Development Strategy.

Photos 6.5 and 6.6: Greening the school yard, primary school Essafa, Mohammedia prefecture, Casablanca-Settat Region



Photo credit: ECE EPR Team



Other programmes promoting ESD

In the period 2012–2017, ESD and, in particular, environmental education, were promoted through several programmes implemented in partnership by the then Ministry of National Education, Vocational Training, Higher Education and Scientific Research and the then Department of the Environment of the Ministry of Energy, Mines, Water and the Environment, and with several other public authorities, including the Ministry of the Interior, the then Ministry of Labour and Professional Integration, the then Ministry of Culture, Youth and Sports, the then Ministry of Solidarity, Social Development, Equality and the Family, and the Ministry of Religious Endowments and Islamic Affairs.

The three objectives of the Programme on Environmental and Sustainable Development Education (2009–2017)¹⁷⁶ were to: (i) popularize the concept of sustainable development among students and youth and, through them, their parents; (ii) build the capacities of facilitators of environmental clubs in schools, youth centres and environmental education centres; and (iii) establish a national network of environmental clubs. The theoretical component of the capacity-building was structured in line with the “Pressure–State–Response” model and included selected topics (water and sanitation, solid waste, air pollution, vegetation cover and deforestation, desertification and oases, and biodiversity) depending on the regional characteristics. The Programme was operationalized through a partnership agreement

between the ministries in charge of the environment, national education, and youth and sport, the Mohammed VI Foundation for Environmental Protection, the Association of Teachers of Life and Earth Sciences and other associations active in the fields of environmental education and ESD.

The Programme on Environmental Upgrading of Rural Schools (2009–2017) ran activities to equip rural schools with basic infrastructure (sanitation, drinking water, etc.) and to strengthen environmental education by setting up environmental clubs and training the facilitators of these clubs. Implemented jointly by the ministries in charge of the environment and of education, the Programme resulted in: the environmental upgrading of nearly 1,000 rural schools (budget of nearly 125 million dirhams¹⁷⁷); establishing nearly 450 environmental clubs and equipping them with computer and audio-visual equipment and environmental materials (budget of 6 million dirhams¹⁷⁸); and conducting 65 training sessions in environmental education for nearly 2,300 facilitators (budget of over 5 million dirhams¹⁷⁹).

Following the successful Programme on Environmental Upgrading of Rural Schools, in 2017, the two ministries involved signed a partnership agreement on strengthening education for the environment and sustainable development (EESD) in schools and, within that framework, initiated a new programme – the Integrated Programme on Education for Environment and Sustainable Development in Schools (2018–2020) – aimed at strengthening the

¹⁷⁶ www.environnement.gov.ma/fr/124-strategies-programmes/programmes-et-projets/853-programme-d-education-a-l-environnement-et-au-developpement-durable?showall=1&limitstart= .

¹⁷⁷ US\$13,988,144 per exchange rate at 26 February 2021.

¹⁷⁸ US\$671,348 per exchange rate at 26 February 2021.

¹⁷⁹ US\$335,718 per exchange rate at 26 February 2021.

awareness of students and teachers about environmental and sustainable development issues. In addition to continuing to develop the capacities of facilitators of environmental clubs, the Programme objectives were to: establish model schools for sustainable development integrating the concepts and fundamentals of sustainable development; promote EESD; consolidate and coordinate initiatives on EESD and develop synergies between stakeholders in schools; set up a national network of model schools for sustainable development; and develop partnerships at national and international (e.g., Mediterranean Basin) levels to strengthen the exchange of experience and know-how in EESD. Concrete actions included: installing solar panels for energy saving; installing rainwater collection systems; introducing a sorting system for waste; developing green spaces and purchasing maintenance tools; as part of extracurricular activities for EESD, setting up environmental clubs and developing teaching materials; and developing teachers' capacities in EESD through training courses, workshops, networking and dialogue among stakeholders in EESD. In addition to the two ministries, the other partners in implementing the Programme were the Mohammed VI Foundation for the Protection of the Environment, local authorities in provinces and municipalities, representatives of the private sector, civil society (in particular the Association of Teachers of Life and Earth Sciences) and international partners.

The Programme on Environmental Upgrading of Mosques and Koranic Schools (2009–2017), implemented jointly by the ministries in charge of the environment and Islamic affairs, resulted in connecting more than 1,600 mosques and koranic schools to the drinking water and sanitation networks (budget exceeding 214 million dirhams¹⁸⁰). A new and similar programme is under development, aimed at continuing the environmental upgrading of religious institutions, especially in remote areas, including by connecting them to drinking water and sanitation networks, setting up rainwater recovery systems, providing solar panels and a system for waste sorting and recycling, and establishing and equipping environmental clubs.

The Eco-Schools programme in Morocco is considered one of the most efficient initiatives in promoting environmental awareness among both students and teachers. Started in Morocco in 2006 at

the initiative of the Mohammed VI Foundation for the Protection of the Environment, the programme has encompassed some 2,500 schools over time and, in 2021, 310 schools were participating (box 6.2).

“For a School of Equity, Quality and Promotion: Strategic Vision of Reform 2015–2030”,¹⁸¹ adopted by the Higher Council for Education, Training and Scientific Research, aims to establish a “new school” based on equity and equal opportunities, quality for all and efficient and tailored implementation of education, including by means of an integrated curriculum at all levels of education and revising the teaching programmes, methods and evaluation. The Strategic Vision sets out 23 initiatives for reforming the education and training system, including a proposal to focus primary education on knowledge and skills relating to scientific and environmental issues.

The National Programme for the Generalization and Development of Preschool, launched on 18 July 2018, aims to expand preschool education by the 2027–2028 school year through developing, upgrading and improving the infrastructure in public schools. The Programme is implemented by the ministry in charge of education in partnership with other relevant authorities, such as the Ministry of the Interior.

The National Vocational Training Strategy 2021¹⁸² for the period 2015–2021 was developed to address priority actions related to technical and vocational education and training that are set out in the Strategic Vision of Reform. It aims to strengthen the role of TVET as a major contributor to the sustainable development of Morocco, including by increasing the resources allocated for TVET to enable it to fulfil its role. The main strategic directions are to: guarantee the right to TVET through social and territorial inclusion; improve company competitiveness as actors and training spaces (providing TVET within a company space for 50 per cent of apprentices and in-service training for 20 per cent of employees per year); increase professional integration through improving the quality of TVET (target of 75 per cent by 2021); integrate general education with TVET to make TVET more appealing and enable youth to express their vocation; and strengthen the governance of the TVET public policy to encourage performance and synergy. Neither ESD nor environmental education are mentioned in the Strategy.

¹⁸⁰ US\$23,925,405 per exchange rate at 1 March 2021.

¹⁸¹ www.csefrs.ma/wp-content/uploads/2017/09/Vision_VF_Fr.pdf and www.csefrs.ma/wp-content/uploads/2015/05/Re%CC%81sume%CC%81-vision-Anglais.pdf.

¹⁸² www.dfp.gov.ma/images/pdfdocs/2016/Brochure%20Strat%C3%A9gie%20D%C3%A9taille%20Fr.pdf and www.dfp.gov.ma/.

The multi-year Action Plan for higher education and scientific research (2017–2022)¹⁸³ aims to promote “the quality” of the Moroccan university. The ministry in charge of higher education plans to develop a forward-looking multi-year roadmap intended for Moroccan universities. ESD is not included in the Action Plan.

The National Strategy for the Development of Scientific Research by 2025 (2015–2025) sets objectives for a decade of strengthening and modernizing scientific research and innovation in Morocco, including governance, infrastructure, data management and financing. It identifies several challenges for advancing development and scientific research in Morocco, including in the education sector and in accessing basic services. Neither ESD nor environmental education are mentioned in the Strategy.

The INDH,¹⁸⁴ implemented in 2005 under the leadership of the Ministry of the Interior in partnership with other relevant public authorities, contains under its Programme No. 4 activities to boost the human capital of upcoming generations. For example, activities include the provision of early childhood education in rural and remote areas and ensuring the quality of preschool education and, for children and teenagers, creating the necessary conditions for their academic growth and success, such as enhancing access to tutoring in disadvantaged areas, promoting extracurricular activities and raising public awareness. Phase III of the INDH (2019–2023) could serve as an efficient means to integrate ESD in the activities planned under Programme No. 4, as well as other activities.

The National Strategy for Education and Awareness of the Environment and Sustainable Development was developed in 2008 in the framework of the project “Strengthening national capacities in education and environmental awareness in the fields of biodiversity, climate change and desertification” financed by the European Union.¹⁸⁵ There is no information on activities undertaken to implement the Strategy, nor an assessment of progress achieved. As at 2021, implementation of the Strategy is no longer considered by the public authorities concerned.

The 2014 CNEDD stipulates environmental rights, including everyone’s right to benefit from education and training enabling them to exercise their environmental rights and duties. The 2011 Report on the Operationalization of the National Charter for the Environment and Sustainable Development¹⁸⁶ highlights the value of environmental education and the need for practical approaches to raising public environmental awareness and ensuring that environmental protection is included in all cycles of education and training. Making environmental education compulsory and introducing concepts of environmental protection at all levels of school education, including in summer camps and all literacy programmes, was recommended at that time.

Environmental protection is mentioned in the 1999 National Charter of Education and Training as a basic notion to be acquired by pupils in the first cycle of primary school (6- to 7-year-olds).

Government Programmes

The Government Programme for 2012–2016 included several provisions related to ESD and environmental education. For instance, the Government committed to developing a national strategy for education in human rights and traditional Moroccan values, by involving the departments concerned. The preservation and sustainable management of forests, highlighting their fundamental role in environmental education, was included among the objectives of the Programme. Other objectives were to strengthen the role of schools in raising awareness of values of citizenship, equality, human rights, fairness and tolerance, and to encourage youth participation in political life and associative action, including through a youth citizenship caravan project.

As a follow-up, instead of a national strategy, Morocco developed a National Action Plan for Democracy and Human Rights (2018–2021),¹⁸⁷ aiming to consolidate the process of political reforms, institutionalize the protection and promotion of human rights and encourage initiatives contributing to the emergence of a participatory democracy. The ministries in charge of human rights and of education, in partnership with the Citizenship Forum, launched

¹⁸³ www.enssup.gov.ma/en/plan-d-action-du-ministere-2017-2021 and <https://maroc-diplomatique.net/plan-daction-2017-2022-lenseignement-ambitionne-de-promouvoir-qualite-de-luniversite-marocaine/>.

¹⁸⁴ www.indh.ma/en/upcoming-generations/.

¹⁸⁵ <http://extwprlegs1.fao.org/docs/pdf/Mor170033.pdf>.

¹⁸⁶ www.environnement.gov.ma/PDFs/operationnalisation_fr.pdf.

¹⁸⁷ <https://didh.gov.ma/fr/publications/plan-daction-national-en-matiere-de-democratie-et-des-droits-de-lhomme-2018-2021/#:~:text=Le%20plan%20d'action%20national,%C3%A9mergence%20d'une%20d%C3%A9mocratie%20participative>

the “School of Human Rights” programme with the objective to mobilize various school actors to integrate the principles and values of human rights into curricula, as well as to strengthen schools’ role and capacity in promoting human rights. Furthermore, the programme aims to promote human rights education clubs in educational establishments, strengthen their roles in school life, expand their regional and local dimension and put in place mechanisms for implementation and monitoring of this programme at the level of the Regional Academies for Education and Training.

The Government Programme for 2017–2021, in the field of education, focuses on implementing the reform of the education and training systems and scientific research, including increasing the schooling rate at college level to reach 97 per cent in 2021 (from 88.3 per cent in 2017) and reducing the illiteracy rate to 20 per cent in 2021 (from 30 per cent in 2017). Other activities planned in the education sector are to: ensure equity and equal opportunity for access to education, including taking the necessary measures to encourage the education of girls in rural areas; improve access to and quality of studies in higher education, including improving the enrolment rate to 45 per cent in 2020–2021 (from 33 per cent in 2017); develop job-oriented vocational training, and improve the governance of the education and training system. The Programme does not include specific activities linked to ESD or environmental education.

Implementation of Recommendation 3.4 of the first EPR

The first EPR recommended to the ministries in charge of education, in cooperation with the ministry in charge of the environment and other relevant public authorities, media representatives, NGOs and other stakeholders, to coordinate the development of a national strategy for environmental education and ESD (Recommendation 3.4). As at April 2021, the

country does not have a national strategy specifically addressing environmental education and ESD. However, the SNDD includes several actions to promote ESD. An overarching national action plan (or a roadmap) on ESD with concrete activities, partners, timelines, resources, and comprehensive indicators to monitor progress, has not been developed with a view to guiding and organizing comprehensive action by all relevant actors to advance ESD. The recommendation was not implemented.

Institutional framework

Since 2012, the institutional framework for ESD has undergone changes alongside overall changes in the education sector. The three former ministries in charge of education were amalgamated into a single Ministry of National Education, Vocational Training, Higher Education and Scientific Research in 2018, thereby consolidating and streamlining their activities. In addition to overseeing national education and TVET, the Ministry was responsible for coordination of all universities and research programmes, including biodiversity research, as well as the National Strategy for Education and Awareness of the Environment and Sustainable Development. In October 2021, the Ministry was split into the Ministry of National Education, Preschool and Sports and the Ministry of Higher Education, Scientific Research and Innovation.

The Directorate of Valuation, Organization of School Life and Joint Inter-academy Training of the ministry in charge of national education is the main actor coordinating the promotion of ESD and environmental education. Since 2009, the Department includes a unit overseeing the implementation of the project “Environment and Sustainable Development”, which provides the framework for activities to operationalize the CNEDD by mainstreaming ESD and environmental education into the primary and secondary education schools (box 6.3).

Box 6.3: Promoting ESD and environmental education

The ministry in charge of national education runs the project “Environment and Sustainable Development” with the aim to promote and develop ESD and environmental education, engage educators in environmental protection activities, establish awareness-raising and education programmes in schools, teach children to preserve natural resources and promote the concept of “think globally, act locally”. Implementation activities include promoting the Eco-Schools programme in primary schools across the country, supporting the “Young Reporters for the Environment” programme, promoting the use of energy-saving lighting in primary, college and lyceum education facilities, advancing the voluntary carbon offset programme, participating in the actions “A pupil, a tree – a school, a forest” and “Sustainable management of water consumption”, and the environmental upgrading of rural schools programme. Other flagship activities include implementing the national programme on combating plastic bags and the Global School programme. Non-formal and informal ESD and environmental education advanced well in the country as a result of these activities.

Source: Director, Environment and Sustainable Development project.

Every authority is expected to be aware of and understand well the issues of environmental protection and sustainable development to adequately put into practice its respective action plan for implementing the SNDD (structured around seven main issues). More specifically related to the education sector are Issue No. 6 aimed at promoting human development and reducing social and territorial inequalities, and Issue No. 7 aimed at promoting a culture of sustainable development. As at 2021, ESD is not integrated into mandatory in-service training of civil servants and other professionals.

The implementation of Issue No. 7 is split among several ministries and departments within ministries. The ministry in charge of education is a lead actor, having a clear mandate to work on ESD and environmental education, given that promoting ESD through seven clusters of activities is explicitly included in the Action Plan for the Ministry of National Education, Preschool and Sports as a strategic direction for implementing Issue No. 7 (table 6.1). Nonetheless, the seven activities related to ESD are formulated in a generic strategic manner, without any specific action, concrete timeline, estimated financial implications, identified stakeholders or established indicators for monitoring progress. Furthermore, the Ministry has a mandate to work on strengthening the research applied for sustainable development and green economy with seven clusters of activities. Similarly, these activities are strategic in their nature, lacking a concrete implementation roadmap. In addition, the Ministry naturally has a mandate to work on Issue No. 6, including improving the quality of public education, strengthening the skills of teaching staff, strengthening literacy, combating social and geographic inequalities in accessing education, and developing equity for children with special needs. Also, the Ministry is tasked to improve regional knowledge on climate change through promoting R&D at the regional level, supporting the implementation of Issue No. 4 on accelerating the implementation of national policy on combating climate change.

The ministry in charge of the environment has a broad mandate in raising awareness at all levels on environmental protection and sustainable development. Under Issue No. 7, the ministry is tasked with developing and implementing communication plans on various issues related to the environment and sustainable development, focusing on regional and local specificities by ensuring the diversification of action and supporting the targeting of all stakeholders (decision-makers, elected officials, economic operators, NGOs, mass media) and the population.

Further actions assigned to the ministry are strengthening local actions undertaken by associations and local authorities and encouraging and supporting exhibitions on sustainable development issues. Concerning raising awareness about climate change (Issue No. 4), the ministry is required to undertake several actions, such as to: further integrate climate science and engineering into university courses and engineering training; organize workshops to strengthen capacity on climate change themes in order to integrate climate change into policy and decision-making processes; raise awareness among the various stakeholders of the issues of climate change; develop educational and methodological tools; and set up capacity-development programmes.

The Ministry of Energy Transition and Sustainable Development has a Division of Education and Communication that includes an Information and Awareness Service, a Documentation and Guidance Service, and an Educational Programmes Service (box 6.4).

The implementation of Issue No. 7 is also included in the action plan of the ministry in charge of agriculture, making it responsible for ensuring the training of the part of the agriculture workforce currently employing traditional methods, in order to master good agricultural practices, in particular the production practices of organic farming.

The ministry in charge of industry, investment, trade and digital economy is mandated to promote green technologies as part of the green ecosystem to advance the implementation of Issue No. 7.

The ministry in charge of crafts and social economy has several clusters of activities to strengthen and promote crafts activities in the desert and oasis areas under Issue No. 7, including to ensure the transfer of traditional knowledge and skills to future generations.

The ministry in charge of culture and communication is tasked to promote cultural activities for raising public awareness on issues related to sustainable development, identify cultural ambassadors for sustainable development and initiate educational activity projects on cultural heritage, all in advancing the practical implementation of Issue No. 7.

The ministry in charge of employment and professional integration is mandated to strengthen the development of green jobs, define priority green jobs and define the needs for training for green jobs (Issue No. 7).

Box 6.4: Raising awareness on environmental protection and sustainable development

The Division of Education and Communication of the Ministry of Energy Transition and Sustainable Development carries out awareness-raising activities to promote environmental protection and sustainable development to governmental authorities, children, the media, local authorities, NGOs, commercial operators and the public at large. Activities include hosting an Educational Centre (established in 2015 with the capacity to receive some 1,500 children per year) and a Resource Centre (reorganized in 2017 and since 2018 undergoing the digitization of resources, with 90 per cent completed as at 2021) and organizing interactive group visits, operating five “caravans on environment and sustainable development” (stationed for one week per school), running activities in the framework of the Hassan II Prize for the Environment, organizing activities and events in conjunction with international environment-related days, and contributing to TV shows and debates, such as on climate change, water and energy efficiency, and waste management.

In addition, the Division is conducting internal information and awareness-raising activities for the Ministry’s staff. With the increase in online activities, especially in times of pandemic, the available personnel resources in the Information and Awareness Service are no longer sufficient. Engaging additional staff with expertise in infographics and digital marketing would support the smooth and enhanced operation of awareness-raising activities.

The Ministry of Religious Endowments and Islamic Affairs is a key partner along with the ministries in charge of education and of the environment in carrying out programmes for the environmental upgrading of koranic schools and mosques.

Thus, the primary mandate for ESD and environmental education is with the ministry in charge of education as a lead authority. The ministry in charge of the environment is tasked with raising environmental awareness. Several other ministries are mandated to raise awareness, train and develop capacities related to various aspects of climate change, sustainable development, organic agriculture, green economy, green jobs and conserving traditional knowledge and skills.

The Higher Council for Education, Training and Scientific Research established in 2014 (Law No. 105-12) is an independent advisory body that includes representatives of civil society (six as at 2021) and students (four as at 2021), in addition to representatives of many other authorities and institutions. In particular, the Higher Council developed the Strategic Vision of Reform 2015–2030 through a participatory approach and broad consultations, involving many political, social and economic actors and partners in addition to representatives of civil society, the private sector and education experts. The Higher Council could serve as a high-level body overseeing the development and integration of ESD into the curricula at all levels of education.

The Mohammed VI Foundation for the Protection of the Environment is a lead organization promoting ESD and environmental education and raising the environmental awareness of the Moroccan population. NGOs engaged in environmental and social activities are key actors in the implementation of non-formal education programmes and in promoting ESD and environmental education in non-formal and informal

education at the national and local levels. Usually, NGOs are involved in the implementation of various education programmes, in particular extracurricular activities, through partnership agreements with relevant public authorities.

The schools and other education institutions in the country are also part of the institutional framework for ESD. Each school and institution is expected to adopt a whole-of-institution approach to ESD. Educators and teaching personnel are expected to develop and use competences in ESD in their daily work. In 2018–2019, Morocco had 36,099 schools and education institutions offering traditional and public education, of which 5,994 offered primary and secondary education in rural areas, including:

- 25,067 public preschool institutions, of which 18,882 offered traditional education and 6,185 public education; compared with 2016/2017 and 2017/2018, the trends show increasing numbers of institutions;
- 7,789 schools, of which 4,762 were rural and offered public primary education, trends showing an increasing number of schools compared with the two previous school years;
- 2,007 colleges, of which 872 were in rural areas and offered public secondary college education, and 1,236 lyceums, of which 360 were in rural areas and offered public secondary qualifying education; the number of colleges and lyceums increased every year for at least the past three years.

The ministries in charge of education and of the environment worked for nine years (2009–2017) on the environmental upgrading of some 1,000 rural schools; the budget of nearly 125 million dirhams was for the environmental upgrading of more than 6,000 schools, colleges and lyceums in rural areas. On this basis, the two ministries would need to considerably speed up their efforts through similar programmes to

advance, as a minimum, the environmental dimension of ESD, and increase financial resources for such activities. Also, providing in-service training on environmental education and ESD to the growing number of teachers needs to be factored into the planning of activities and ensuring adequate resources (financial and training personnel). Expanding such activities to cover all preschool institutions is of paramount importance to set the basis for ESD from early education onward. Mainstreaming ESD into the growing number of public education institutions in the country (there are more than 36,000) would require colossal efforts and resources, without which, however, the country would not be able to be on the right track towards achieving sustainable development by 2030.

Operationalization of ESD

The approach of the ministry in charge of education to involving technical and financial partners and NGOs in its work on ESD and environmental education, as part of the reform of the education sector, is designed in such a way as to ensure mutual synergies and avoid duplication and wasted effort. To this end, the ministry uses two main guiding documents, namely, the 2019 Framework Law No. 51-17 and the Strategic Vision of Reform 2015–2030. The ministry is implementing the Strategic Vision through 18 integrated projects. ESD activities are integrated into Project no. 5 through training and school life activities on one hand, and the introduction of principles of sustainable development and environmental protection in the curricula of different cycles and branches of the education system on the other hand.

In terms of financing the promotion and implementation of ESD and environmental education, in line with Framework Law No. 51-17 and Organic Law No. 130-13 on the Law on Finances, Morocco foresees that projects on ESD and environmental education will be developed as contractual projects, running over a period of three years. Such projects are expected to be carried out through partnership agreements between the national authorities in charge of education and other stakeholders, from the public and private sectors and civil society.

The “Education and training for employability” project,¹⁸⁸ with a budget of US\$220 million, aims to strengthen the employability of young people by improving the quality and relevance of secondary education, vocational training and employment programmes, and equitable access to these

programmes, to better meet the needs of the production sector (box 6.5). In the framework of cooperation with UNESCO, Morocco implements a flagship project aimed at strengthening the education system for promoting global citizenship education and living together, as well as the establishment of a training system for preschool educators. In addition, the system of schools associated with UNESCO in Morocco has been restored. These schools integrate the environmental dimension into their action plans. Moreover, developing a human rights culture among Moroccan youth was promoted through the development of teaching materials and organization of capacity-development workshops by the National Human Rights Council in cooperation with UNESCO (box 6.6).

Work on promoting ESD and environmental education is operationalized through various partnership agreements, such as the three-year agreement signed in June 2017 between the ministries in charge of the environment and of education and the Regional Academies for Education and Training for strengthening environmental education and sustainable development in schools. The agreement includes a new integrated education programme for the environment and sustainable development in schools, which mainly aims to set up model schools in terms of sustainable development integrating green technologies. More recently, in February 2021, the Minister of National Education, Vocational Training, Higher Education and Scientific Research and the Director-General of the Moroccan Agency for Energy Efficiency signed a framework partnership agreement concerning the implementation of energy-saving measures, awareness-raising and training in the green economy and energy efficiency.

To support the operationalization of ESD and environmental education, during the decade from 2009, the State Secretariat in charge of Sustainable Development, in collaboration with Association of Teachers of Life and Earth Sciences, succeeded in creating more than 22 environmental education centres and a solid network of more than 520 environmental clubs across the country, mainly based in schools, youth centres and community centres, and even at the level of certain associations active in the field of environmental education and sustainable development. For example, the Casablanca Environmental Education Centre has 10 facilitators (six teachers of life and earth sciences and four students).

¹⁸⁸ www.mcamorocco.ma/fr/education-et-formation-pour-employabilite.

Box 6.5: “Education and training for employability” project

The project, implemented by the Millennium Challenge Account Morocco Agency since 2017, is structured around three activities – secondary education, vocational training and employment. In particular, project activities targeting secondary education (US\$111.4 million) aim to develop an Integrated School Improvement Model called “Challenge School” based on strengthening schools’ autonomous management, promoting student-centred learning and improving the physical learning environment through adequate rehabilitation of school infrastructure and providing the necessary equipment for educational innovation. This model is implemented in 90 lower and upper secondary education schools across three regions (Tanger-Tétouan-Al Hoceima, Fès-Meknès and Marrakesh-Safi).

The Education for Employability Partnership Fund established within the project co-finances innovative activities for improving learning, through the implementation of partnerships among civil society, the private sector and schools. The project also aims to strengthen the Student Learning Assessment System and the Education Management Information System “MASSAR”, as well as to develop a new approach for school operations and maintenance. The “Technical and Vocational Education and Training” (TVET) Activity (US\$80.42 million) is based on two components: (a) establishing the “Charaka” Fund dedicated to supporting the financing of the creation or expansion of TVET centres managed through public–private partnerships (PPPs) or the conversion of existing public TVET centres from a traditional state-led management model to a PPP management model, driven by private sector demand; and (b) supporting the operationalization of TVET sector policy reform. The “Employment” Activity (US\$27 million) covers four components: (a) supporting the improvement and integration of the labour market observation system; (b) promoting inclusive employment for people facing difficulties entering the labour market, especially women, non-graduates and graduates of higher education or TVET in a situation of long-term unemployment, through results-based financing of services and support programmes for their inclusion; (c) supporting impact assessment of employment and labour market policies; and (d) supporting the promotion of gender equity in the workplace. ESD is not included as an explicit component in any of the project activities; however, the envisaged project outcomes are important for mainstreaming ESD into the education system of Morocco.

Source: Millennium Challenge Account Morocco Agency, “Education and Training for Employability” project.

Box 6.6: Citizenship Education and Human Rights for Youth

In 2015, a Manual on Citizenship Education and Human Rights for Youth in Morocco was published jointly by the National Human Rights Council (CNDH) and UNESCO, with support from the Spanish Agency for International Development Cooperation. This was produced with the aim of promoting a human rights culture among Moroccan youth. The Manual contains 20 factsheets and lesson plans, looking at the development of human rights and human rights actors and mechanisms, from both an international and national perspective. It also contains practical exercises that detail actions that young people can undertake to learn about and promote human rights.

In one section describing the development of the “generations” of human rights, the right to a healthy environment is mentioned as one of the “3rd generation” of human rights. The Manual also refers to the Constitution of Morocco, which contains the right to a healthy environment and development. Moreover, the Manual refers to the work of the CNDH which, in 2013, received 41,704 complaints relating to abuse of power, attacks on physical integrity, abuse, the rights of detainees, and social and environmental rights. This demonstrates the intention to make young people aware of the mechanisms for human rights protection in Morocco and their right to a healthy environment. Furthermore, practical exercises on respect for the environment and right to health show how the Manual also encourages young people to take an active part in a human rights culture.*

Following the publication of the Manual, in 2018, a series of workshops on citizenship and human rights education were held in several Moroccan cities within the framework of a partnership between UNESCO and the CNDH. The trainers of these workshops were able to develop kits through the Manual to teach young people about human rights. **

Sources: * Amina Belouchi and others, *Éducation à la Citoyenneté et aux Droits de l’Homme: Manuel pour les Jeunes au Maroc*, Série de l’UNESCO Les Jeunes et la Participation Démocratique (UNESCO, 2015).

** Trainings in Citizenship and Human Rights Education for Youth in Morocco: <https://en.unesco.org/events/trainings-citizenship-and-human-rights-education-youth-morocco>.

The Casablanca-Settat Region is also engaged in promoting ESD and environmental education in schools through joint efforts by the regional authorities in charge of the environment and of education (box 6.7).

Sustainable Development Goals

At the initiative of the ministry in charge of education – the public authority in charge of achieving SDG 4 – Morocco has established the National Coordination Committee for SDG 4, which has been operational since 2016. The Committee consists of all ministerial,

public and other institutions concerned with the various aspects of the 10 targets of SDG 4, in addition to the National Commission for Education, Science and Culture, UNESCO and UNICEF. The Committee is mandated to coordinate activities to achieve SDG 4, including to: advocate for compulsory quality education, especially for students from marginalized areas; regularly monitor and evaluate developments in the field of education; mobilize human, financial and material resources; produce and exchange information and expertise in the field of education at the regional and national levels; and prepare regular reports to monitor the progress of national actions aimed at achieving SDG 4. The Committee has met several times; nonetheless, limited progress has been made since 2016. Thus far, the Committee has undertaken a mapping exercise by identifying a set of sectoral policies and public partners that must be involved in achieving SDG 4, but it is limited to just identifying policies and actors without complementing the mapping with effective planning of actions needed, engaging actors and financing activities.

Concerning the nationalization of SDG 4 targets, the actions carried out by the ministry in charge of education remain limited in scope, mostly resulting in the organization of meetings of the National Coordination Committee for SDG 4 and taking some actions at the central level, without the involvement of other partners. At the same time, the country's

Strategic Vision of Reform 2015–2030 is aligned with the 10 targets of SDG 4 and serves as a strategic framework for achieving SDG 4. At the legislative level, Framework Law No. 51-17 regulates the implementation process, including the means of action, the responsibilities of various stakeholders and the modalities of governance, management and assessment. The implementation mechanism of the Strategic Vision through 18 projects provides the platform for operationalizing the 10 targets. The ministry in charge of education reports that these arrangements have enabled the adaptation of the global targets and indicators of SDG 4 to the national context. The ministry expects to reach all targets of SDG 4 by 2030 through successful implementation of the Strategic Vision.

Regarding monitoring and reporting on the achievement of SDG 4 targets, the ministry in charge of education undertook preliminary research of data availability to complete the 43 relevant indicators,¹⁸⁹ identifying 25 indicators for which the data are under the responsibility of the ministry in charge of education, of which 19 are available and six require additional specific surveys. Of the 18 other indicators, seven are the responsibility of the HCP, two are the responsibility of international bodies, six are the responsibility of other ministerial departments and three remain to be determined in terms of calculation methods.

Box 6.7: Promoting ESD and environmental education in the Casablanca-Settat Region

Within the Programme on Environmental and Sustainable Development Education (2009–2017), the Regional Environment Directorate (DRE), in cooperation with the Regional Education Academy, of the Casablanca-Settat Region, have equipped and contributed to the establishment of 48 environmental clubs and organized several training courses for more than 50 educators and trainers engaged in the environmental clubs in the Casablanca-Settat Region.

Moreover, the two regional actors are running a pilot project, “environmental redesign of schools”, in six schools at the primary, college and lyceum levels. The capacity of the project in two primary schools in Benslimane Province and Mohammedia Prefecture is 300 pupils and 10 classes and annexes, in two colleges (in El Jadida and Settat Provinces) is 500 students and 15 classes and annexes, and in two lyceums (in Berrechid and Sidi Bennour Provinces) is 1,000 students and 20 classes and annexes.

The environmental redesign of six schools consisted of installing photovoltaic solar panels and supplying LED light bulbs (for lighting classrooms, administrative buildings and the canteen), a rainwater collection and storage system (for collecting, storing and watering the school's green areas), equipment for sorting recovery of solid waste (for separate collection of paper, plastic, organic and garden waste, glass and metal, and rotary composting of garden waste), and equipment for landscaping and watering green spaces (for developing and maintaining the green areas on the school premises).

As at November 2021, the works for environmental redesign of schools were completed. The schools serve as model schools for sustainable development and are connected in a national network of other pilot schools across the country (box 6.1).

¹⁸⁹ www.courdescomptes.ma/upload/MoDUle_3/File_3_643.pdf, para 61.

Photo 6.7: Composting, primary school Essafa, Mohammedia prefecture, Casablanca-Settat Region



Photo credit: ECE EPR Team

Despite the country's efforts to establish the necessary legal, policy, institutional and operational platforms for delivering on SDG 4, several major challenges were identified by the ministry in charge of education, which hinder the country's efforts to achieve all targets of SDG 4 by 2030. These challenges include adequate financing, efficient organization, effective decentralization, good capacities of actors, evaluation, accountability and an integrated information system, and the convergence and coherence of public policies. Notwithstanding the continuous progress made in funding efforts in recent years, the funding needs remain colossal for the proper integration of quantitative and qualitative priorities set by the Strategic Vision and those dictated by the SDG 4 targets. The National Coordination Committee lacks a proper regulatory framework to enforce its mandate and therefore has limited powers, resulting in weak involvement in implementation activities and a narrow scope for its initiatives on SDG 4. Another weakness is the lack of capacity to support a continuing process of alignment, implementation, monitoring and assessment of SDG 4 targets.

During the period from 2015–2016 to 2017–2018, the participation rate of youth and adults (15–24 years old) in formal and non-formal education and training in the previous 12 months, by sex (SDG indicator 4.3.1) increased by 1.4 points, from 46.8 per cent to 48.2 per cent. During the same period, the participation rate of

girls also increased, by 3.3 points, from 42.4 per cent to 45.7 per cent.

In Morocco, the primary education gender parity index improved slightly, from 0.94 in 2015–2016 to 0.96 in 2019–2020, but it remains below 1.0, i.e., in favour of boys. This increase is more pronounced in secondary education: from 0.87 to 0.92 at college level and from 0.98 to 1.10 at qualifying level during the same period (SDG indicator 4.5.1).

During the period 2015–2016 to 2019–2020, the rural/urban parity index between schools in primary education stagnated at around 1.15 in favour of rural areas, which reflects the importance given by Morocco to reducing spatial disparities in education. This index has improved markedly in the secondary education cycle: from 0.56 to 0.69 for college level and from 0.23 to 0.29 for the qualifying level. Nonetheless, the qualifying secondary index remains biased by the large number of rural students who benefit from boarding schools in urban high schools and who are listed as urban students.

Regarding the achievement of literacy and numeracy for all (SDG target 4.6) measured by global indicator 4.6.1 (Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex), in 2014, the illiteracy rate in Morocco was around 41.9

per cent for women and 22.1 per cent for men, showing a decrease in illiteracy over 32 years compared with 1982 (78 per cent for women and 51 per cent for men). The decline in illiteracy in Morocco has been more pronounced among young people under 25 years old. In 2014, the illiteracy rate of the population aged 10–14 and 15–24 was 7.3 per cent and 10.8 per cent, respectively, showing a decrease of around 30 points compared with 20 years earlier: in 1994, the illiteracy rate was 36 per cent and 42 per cent, respectively. Regarding rural/urban disparity, 47.7 per cent of the rural population and 22.1 per cent in urban areas was illiterate in 2014, showing an improvement compared with 1994, when the proportions were 75 per cent in rural areas and 37 per cent in urban areas. However, the illiteracy rate for the adult population and the gap in rural/urban disparity remains considerable and, unless the country greatly speeds up action to address it, it will not be able to reach target 4.6 by 2030. Also, ensuring that all young people are literate by 2030 will be challenging for the country, unless special action is taken to speed up the process.

While ESD is included in several national strategic documents, concrete practical action supported with adequate financial resources to operationalize it by mainstreaming ESD into the formal education system at all levels, as well as into non-formal and informal education, is lacking as at 2021. The country's sporadic efforts in advancing the environmental dimension of ESD through environmental education are insufficient to ensure that it reaches SDG target 4.7 by 2030.

The country works on implementing global citizenship education through projects that operationalize the Strategic Vision of Reform 2015–2030. The “Mowatana” project is in its pilot phase, targeting 3,000 students in 2019, reaching 10,000 beneficiaries within a three-year horizon. The project targets fifth-year primary school pupils, aiming to disseminate and consolidate the values of citizenship, respect for the law and fulfilling one's duty, and to convert these values into the daily practices and behaviours of individuals, groups and institutions.

The ministry in charge of the environment is responsible for attaining SDG targets 12.8 and 13.3. No information is available to enable the assessment of progress made by the mandated ministry in delivering on these two targets, including on whether an institutional mechanism was established, national actions were identified and began to be implemented, and adequate financial resources were ensured. Nonetheless, given that, at the global level, their achievement is measured by the same indicator used

for target 4.7 under the responsibility of the ministry in charge of education, the country would be able to report on progress towards achieving these two targets. Also, the ministry in charge of the environment is pursuing programmes to advance environmental education in rural and koranic schools, which contributes to promoting the environmental dimension of ESD. Furthermore, the ministry's educational and resources centres support raising the environmental awareness of children, young people and the public at large.

6.7 Assessment, conclusions and recommendations

Assessment

Since 2012, Morocco has developed legal (Framework Law No. 51-17) and policy (SNDD, Strategic Vision of Reform 2015–2030) documents that can underpin the integration of environmental education and ESD into the education system. Nonetheless, a specific strategy, an action plan or a roadmap to enable a coherent approach to developing and mainstreaming environmental education and ESD in the education system is lacking.

In terms of legal and policy frameworks for ESD, while there is no dedicated document specifically targeting ESD, the recently established legal and policy frameworks provide a good platform for operationalizing and advancing the implementation of ESD on the ground, through mainstreaming ESD into the curricula at all levels of education, including training of future teachers and in-service training of working teachers. In addition, the programmes for an environmental upgrade of rural and koranic schools support the development of the basic infrastructure and establish basic prerequisites for promoting environmental awareness across the country. The country's project-based approach to implementing the Strategic Vision of Reform 2015–2030 provides a good opportunity to integrate ESD in each of the 18 projects, focused on three areas (equity and equal opportunities; promotion of the quality of education and training; and governance and mobilization). An operational plan or roadmap to guide the country's action on ESD and monitor progress achieved on an annual basis until 2030 is lacking as at 2021.

Concerning the institutional framework for environmental education and ESD, Morocco is on a good path towards establishing a multi-stakeholder mechanism to coordinate activities for developing and integrating ESD. The country has a good multi-stakeholder approach (lead ministries in charge of education and of the environment in partnership with

other relevant ministries and civil society organizations) in implementing several programmes (e.g., the environmental upgrading of rural and koranic schools). More recently, the Strategic Vision of Reform 2015–2030 has been developed through a broad consultation process. Framework Law No. 51-17 enables the establishment of working groups to develop the education sector, thereby providing the legal grounds for establishing a special multi-stakeholder working group on ESD. The Mohammed VI Foundation for the Protection of the Environment is the main actor promoting environmental education and ESD as at 2021. The involvement of civil society is limited to several NGOs active in the field of environmental education. Also, business entities are not sufficiently attracted to participating in ESD, including to financially support the implementation of ESD programmes on the ground.

Given the nature of ESD, every educational institution is also part of the institutional framework for ESD. Morocco is making good efforts by promoting eco-schools and the environmental upgrading of rural and koranic schools. However, such efforts require continued and increased support if the country is to be able to cover all schools by 2030. Also, the growing number of educators and teachers lack both education (for future teachers) and in-service training on ESD. Furthermore, adequate teaching materials, guidance and research on ESD is lacking.

Regarding the implementation of Recommendation 3.4 of the first EPR, as at 2021, a national strategy for environmental education and ESD has not been developed. Given that the SNDD includes several actions to promote ESD and could serve as a strategic document for ESD, such a recommendation might no longer be relevant for the country. Instead, the ESD stakeholders would need to consider developing an overarching national action plan on ESD with concrete activities, partners, timelines, resources and indicators to monitor progress, with a view to guiding and organizing comprehensive action by all relevant actors to advance ESD.

Concerning the achievement of SDG targets related to ESD, Morocco has made good progress in setting conditions for reforming its education system and including ESD in the main national strategic document guiding sustainable development efforts; however, little progress in practical implementation of mainstreaming ESD into the formal education systems has been made. Based on activities undertaken thus far in ESD and environmental awareness, the country will not be able to attain SDG targets 4.7, 12.8 and 13.3 by 2030, unless it speeds up its efforts considerably and significantly increases the allocated resources.

Conclusions and recommendations

From strategy to practical implementation of education for sustainable development

ESD is included in the SNDD as a priority for strengthening eco-citizenship, through education, awareness and communication programmes. The implementation of the Strategy's seven actions for promoting ESD and reporting on the four indicators to assess progress is under the responsibility of the Ministry of National Education, Preschool and Sports as at 2021 and is included in its Action Plan. The four national indicators to measure progress in ESD are limited in scope and will not enable the country to assess the achievement of SDG indicators 4.7.1, 12.8.1 and 13.3.1 as they lack the information required to assess the extent of ESD integration. Concrete implementation activities under each action, partners, timelines, resources needed for the adequate implementation of ESD, and comprehensive indicators for monitoring implementation, are lacking. Based on the country's efforts in promoting ESD thus far, starting with the development in 2008 of a national strategy and not pursuing its implementation in practice, ESD activities included in the SNDD are not translated into adequate action on the ground.

As at 2021, no policy document includes for ESD detailed activities, lead actors and cooperating partners, timelines with deadlines, estimation of resources necessary and their sources, comprehensive indicators to measure progress in implementing activities and a mechanism for regular reporting on progress made.

A multi-stakeholder working group on ESD is not established, despite the provisions of the 2019 Framework Law No. 51-17, which provide an opportunity for the establishment of a working group specialized in ESD with the mandate to prepare proposals to integrate ESD into the curricula, programmes and training.

Programmes for the environmental upgrading of rural and koranic schools and mosques, implemented by the ministries in charge of the environment and of education in partnership with other stakeholders, proved successful in advancing environmental education in rural areas.

Regarding ensuring financing for ESD in Morocco, the main responsibility for financing education lies with the State. All ESD stakeholders indicated that ensuring adequate financing for the activities needed to integrate ESD at all levels is a major challenge for the country.

Recommendation 6.1:

The ministry in charge of education, in cooperation with the Department of Sustainable Development and other relevant ministries and institutions, should develop and mainstream ESD into the education system at all levels, including by:

- (a) *Establishing a multi-stakeholder working group on ESD and ensuring a multi-stakeholder process to develop and implement ESD;*
- (b) *Mapping all activities on ESD and environmental education carried out since 2008 and those ongoing in Morocco, with a view to benefiting from their results and acquired experience, and consolidate and increase coherence of future activities on ESD;*
- (c) *Developing and implementing a guiding document for concrete action on ESD as a prerequisite measure to support the mainstreaming on the ground of ESD into all levels of formal, non-formal and informal education systems in Morocco;*
- (d) *Taking practical steps to integrate ESD into the curricula, including by ensuring that key themes related to sustainable development are addressed at all levels of formal education;*
- (e) *Addressing ESD in quality assessment of education and in student assessment;*
- (f) *Ensuring continuous monitoring of progress made.*

Recommendation 6.2:

The Government should:

- (a) *Mandate the Higher Council for Education, Training and Scientific Research to oversee the development and integration of ESD into the curricula at all levels of education;*
- (b) *Ensure adequate financial resources for integrating ESD at all levels of formal, non-formal and informal education and training and in research and development, including by exploring public–private partnerships and other innovative solutions.*

Recommendation 6.3:

The ministry in charge of education, jointly with the Ministry of Religious Endowments and Islamic Affairs, the Department of Sustainable Development and other relevant ministries and institutions, should strengthen ESD through new programmes that build upon former programmes for the environmental upgrading of rural and koranic schools and mosques.

Developing competences for educators and teachers in education for sustainable development

Educators and teachers involved in non-formal and informal ad hoc ESD activities carried out in Morocco show interest in integrating ESD into their classes. However, they lack comprehensive guidance and competences necessary for embracing ESD. The whole-of-institution approach to ESD is lacking in schools and other educational institutions.

Recommendation 6.4:

The ministry in charge of education, in cooperation with relevant ministries and institutions, should:

- (a) *Integrate ESD into the education of future educators, teachers and other education professionals;*
- (b) *Integrate ESD into the in-service training of educators, teachers, school administrators and inspectors, making mandatory such training for all personnel engaged in the education sector;*
- (c) *Strengthen cooperation on ESD among teachers;*
- (d) *Promote a whole-of-institution approach to ESD in schools and other educational institutions at all levels, from preschool to higher education.*

Promoting research and development in education for sustainable development

R&D programmes have the potential to work on ESD. As at 2021, specific R&D programmes on ESD are lacking in the country, thereby hindering the country's advancement in this area.

Mechanisms to harvest local and traditional knowledge and engage representatives from rural areas in developing ESD are lacking in the country.

Recommendation 6.5:

The Government should:

- (a) *Promote and support research and development on ESD and disseminate the results of such research;*
- (b) *Establish mechanisms for fostering conservation, use and promotion of local and traditional knowledge in ESD.*

Supporting civil society efforts to raise awareness about sustainable development and environmental protection

The Mohammed VI Foundation for the Protection of the Environment has been a lead organization promoting ESD for some 15 years. In addition, NGOs active in environmental and social dimensions of sustainable development are key actors in promoting ESD through non-formal and informal education activities. The conditions for continuing involvement in ESD by a larger number of NGOs are lacking in the country.

Reportedly, business is engaged to a varying extent in some projects that include environmental education and ESD activities.

Recommendation 6.6:

The Government should:

- (a) *Support the activities of NGOs for promoting ESD, including through eco-schools and other projects conducive to ESD;*
- (b) *Increase efforts to encourage business entities, including to financially support the implementation of ESD programmes, with a view to enhancing implementation capacity.*

Achieving Sustainable Development Goals through education for sustainable development

Morocco committed in 2015 to achieve the SDGs, including several targets related to ESD (SDG targets 4.7, 12.8 and 13.3). ESD is not only a means in itself but also an efficient and effective solution to advance the attainment of other SDGs by changing people's mindsets towards behaviour and choices conducive to the sustainable development of the country.

As at 2021, there is little evidence of concrete practical measures to operationalize ESD towards attainment of the three SDG targets.

Recommendation 6.7:

The ministries in charge of education and of the environment should establish an assessments system to ensure reporting in 2030 on the achievement of SDG targets 4.7, 12.8 and 13.3, by providing information on the extent to which: (i) global citizenship education; and (ii) education for sustainable development are mainstreamed in: (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment, which the High Commission for Planning should ensure follow-up..

Chapter 7

IMPLEMENTATION OF INTERNATIONAL AGREEMENTS AND COMMITMENTS

7.1 General priorities for international cooperation related to the environment and sustainable development

The 2011 Constitution requires that Morocco's development policies are consistent with sustainable development. Furthermore, sustainable development is indicated as one of the axes of the Government Programme 2017–2021. In the Fourth National SOER in Morocco, published in 2020,¹⁹⁰ international cooperation is a basis of remedies to environmental problems such as climate change. South-South cooperation is mentioned as one of the pillars of the cooperation strategy of the Ministry of Energy Transition and Sustainable Development in its report on activities. Moreover, reinforcing Morocco's international relations and sharing experience on environmental and sustainable development with other countries is an important, key imperative, notably in Africa.

Morocco is party to more than 100 multilateral environmental agreements (MEAs) on environmental protection and sustainable development (annex I). MEAs are also important for setting the priorities for the country's international cooperation. Under these MEAs, the country is required to regularly report on the implementation of its obligations. In the implementation reports of MEAs, the following issues were often underlined:

- The regulatory framework in the country was not expansive enough to cover the entire scope of the respective agreement;
- The financial resources allocated were not sufficient to cover the entire costs of the implementation. Indeed, many activities were carried out thanks to technical support activities provided either directly by the MEAs' secretariats or by their providing funds for specific projects;
- The administrative management in some competent authorities was not functional to meet the needs of the implementation of MEAs;
- Technical guidance is needed;
- Enforcement of measures in place to ensure the implementation of MEAs is also needed.

Recommendation 5.1 of the first EPR asked the Government to improve its reporting under the MEAs to which Morocco is a party, or in accordance with Morocco's obligations thereunder, where necessary. The country made progress in reporting more environmental agreements when compared with the first EPR and implementation is ongoing. Recommendation 5.3 recommended the Government continue building synergies in its efforts to implement the various MEAs to which it is a party. The implementation of this recommendation is ongoing. Morocco is cooperating with various countries to focus on knowledge transfer, the exchange of experience and technical assistance, as well as the development of projects in various environmental fields.

7.2 Selected global multilateral environmental agreements

Since 2012, the country was represented at meetings of regional and international conventions or programmes. Examples of meetings attended include the Meetings of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), the United Nations Environment Assembly (UNEA), the Conference of African Ministers of the Environment, and the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). In 2016, the country also hosted the 22nd Conference of the Parties to the UNFCCC (COP22). At the regional level, it hosted the fifth session of the African Regional Forum on Sustainable Development, the Islamic Conference of Environment Ministers and several capacity-building activities and workshops.

Convention for the Protection of the Ozone Layer

Morocco is fulfilling its reporting obligations under the Convention for the Protection of the Ozone Layer (Vienna Convention). Since 2001, annual reports on ozone-depleting substances (ODS) consumption have been regularly submitted to the UNEP Ozone

¹⁹⁰ www.environnement.gov.ma/images/2021/rapport/letat_de_levironnement_02.pdf.

Secretariat. The country has ratified the Montreal Protocol and all amendments to the Convention, except the Kigali Amendment to the Montreal Protocol.¹⁹¹ However, in its updated NDC (2021), Morocco outlines its ambition to ratify the Amendment and develop policies accordingly.¹⁹² Moreover, the country plans to freeze hydrochlorofluorocarbons (HCFCs) consumption levels in 2024, and start the first stage of reduction from 2029 onwards, notably by transitioning to environmentally friendly refrigerators and air conditioners with low global warming potential.

Most of the substances that have or are likely to have adverse effects on the ozone layer were phased out before 2010 or rapidly thereafter (i.e., methyl bromide in 2012), except for HCFCs. However, the use of HCFCs has greatly decreased, by 41.05 per cent since 2010 and 50.9 per cent compared with the baseline value. The target level has been achieved, as the level of HCFC consumption was at 25.23 ODP tons in 2020 (figure 7.1). Moreover, Morocco is consistently under control limit levels with regard to the consumption of ODS and HCFCs.¹⁹³ This is largely due to the implementation of the Moroccan Phase-Out Management Plan: a multi-stage, long-term programme, planned in two phases. The first phase, implemented in the period Dec. 2011–Dec. 2021, aims to replace HCFC-141b used for flushing refrigeration equipment with alternative solvents. The second phase (Nov. 2014–Dec. 2022) aims at further reducing HCFC consumption to 38.8 ODP tons, by 35 per cent precisely from the baseline of 59.7 ODP tons, before 1 January 2020.¹⁹⁴

Convention on Biological Diversity

Morocco has been a party to the CBD since 1995 and ratified the Cartagena Protocol on Biosafety in 2011.¹⁹⁵ Morocco fulfils its reporting obligations and submitted national reports to the Convention in 2014 (Fifth National Report¹⁹⁶) and 2018 (Sixth National Report, which was updated in 2019¹⁹⁷).

The NBSAP for the period 2016–2020 was also prepared and submitted in 2016. The document aims to make the country's biodiversity a pillar of sustainable development and outlines 159 concrete actions (chapter 11). According to the Sixth National Report, of the 159 recommended actions, 37 are considered effective (about 23 per cent) and 92 are considered partially effective (58 per cent). This reflects the efforts made by the country to implement the NBSAP but also underlines some inefficiencies and areas for improvement. The lack of data or indicators to properly assess some of the recommended actions has been identified as one of the issues faced when working on the implementation of the NBSAP. The Report states that the National Operational Objective concerning the strengthening of mechanisms to monitor and evaluate the implementation of the NBSAP was not reached, despite some visible improvement in recent years, namely through the development of management plans and monitoring indicators to track vulnerable species, as well as the creation of 12 OREDDs.

Concerning the Strategic Plan for Biodiversity 2011–2020, including the Aichi Biodiversity Targets, the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, through its Department of Water and Forests, has set up numerous programmes for the rehabilitation of endangered species. Management and development plans for certain sensitive areas and species, as well as gene banks, have been put in place. In addition, progress has been made in the participation of local populations in the protection of biodiversity through co-management projects between the then High Commission for Water, Forestry and the Fight against Desertification and local populations. Finally, Morocco has launched the Strategy Halieutis, which will support the management of fisheries as a whole by strengthening the sustainability of fisheries in marine ecosystems, respecting the regeneration cycle of marine resources and promoting the exchange of scientific knowledge (chapter 12).

¹⁹¹ <https://ozone.unep.org/all-ratifications>.

¹⁹² www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco%20First/Moroccan%20updated%20NDC%202021%20Fr.pdf.

¹⁹³ <https://ozone.unep.org/countries/profile/mar>.

¹⁹⁴ https://wedocs.unep.org/bitstream/handle/20.500.11822/26589/HFC_Phasedown_FR.pdf?sequence=2&isAllowed=y; <https://open.unido.org/projects/MA/projects/140383>.

¹⁹⁵ www.cbd.int/countries/?country=ma.

¹⁹⁶ www.cbd.int/doc/world/ma/ma-nr-05-fr.pdf.

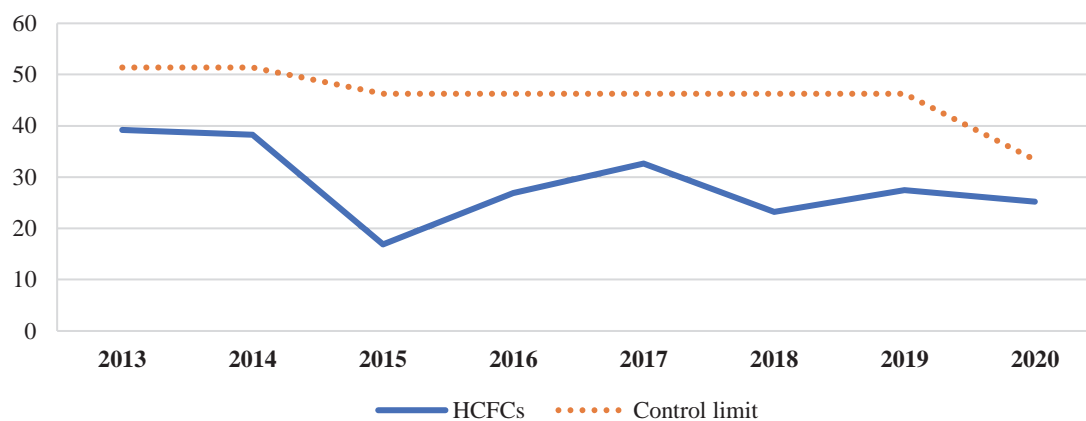
¹⁹⁷ https://ma.chm-cbd.net/implementation/rap_nat/6eme-rapport-national-de-la-biodiversite.

Photo 7.1: Morocco's participation in UNEA, 2022



Photo credit: Department of Sustainable Development

Figure 7.1: HCFC consumption, 2013–2020, ODP tons



Source: UNEP, Ozone Secretariat, 2021.

Morocco is Party to the Nagoya Protocol on Access and Benefit-sharing (ABS) since 2022. The country submitted an interim report on the implementation of the Protocol.¹⁹⁸ Since 2013, the process of implementation has started, notably through the following measures:

- Developing and submitting to the SGG a draft law (No. 89-21) on access to genetic resources and the

fair and equitable sharing of benefits arising from their use and knowledge;¹⁹⁹

- Strengthening the capacities of key actors at the territorial and national levels, to better value genetic resources;
- Creating a guide to intellectual property rights (IPRs) for ABS in Morocco, notably intended for researchers and users of genetic resources;

¹⁹⁸ <https://absch.cbd.int/database/NR/ABSCH-NR-MA-238974>.

¹⁹⁹ www.sgg.gov.ma/portals/0/AvantProjet/152/Projet_loi_56.17_fr.pdf.

- Developing a methodology for identifying traditional knowledge associated with genetic resources;
- Creating a communication strategy and communication plan on ABS in Morocco.

The country has not ratified the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol and has not elaborated a national process to become a party to the Supplementary Protocol.

Cartagena Protocol on Biosafety

Morocco has included in its national targets the operationalization of the Cartagena Protocol through the establishment of legislative, administrative and technical instruments to ensure an adequate level of protection in the field of transfer, handling and use of genetically modified organisms (GMOs) (Target B3). Despite the absence of a system for monitoring and enforcing the implementation of the Cartagena Protocol, the Department of Sustainable Development has prepared and published, in 2019, a study on the development of an action plan for the implementation of the Cartagena Protocol on Biosafety, which gathers information on the effectiveness of the Protocol and the progress made in the implementation of the Strategic Plan for Biodiversity 2011–2020 of the Protocol.²⁰⁰

Even though Morocco is on track to achieve Target B3, the country acknowledges its shortcomings, notably related to insufficient institutional capacity and data availability and the necessity to develop its capacity in the areas of import, transfer, handling, use and risk assessment of living modified organisms (LMOs) to strengthen its position on biotechnology. Furthermore, a national programme for the control and eradication of invasive alien species, and a system for assessing and managing the risks associated with the use of LMOs, are not established.

The ONSSA plays an essential role in the fight against biotechnological risks.²⁰¹ Measures developed by ONSSA include the requirement of a non-GMO certificate when introducing plant material. Furthermore, marketing on seeds and seedlings can only take place for varieties registered in the official catalogue. Moroccan regulations pertaining to this matter have been drawn up in accordance with the provisions of international regulations, methods and

standards. No specific legislation relating to LMOs is in place, nor on the transfer, handling and use of GMOs. There only exists a circular from the Department of Agriculture issued on 11 August 1999 prohibiting the introduction of products from LMOs. Therefore, Recommendation 5.2 (a) of the first EPR, which recommended the Government accelerate the establishment of a legal framework on biosafety, is not implemented and remains valid.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Morocco ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975. The management authority is the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, through its Department of Water and Forests. Scientific authorities are the Scientific Institute of Rabat, the Hassan II Agronomic and Veterinary Institute, the INRH and the National Forestry School of Engineers.

Most species listed in the CITES appendices are protected by the 2011 Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade, and their trade is prohibited.²⁰² The lists of species of wild fauna and flora in Appendices I, II and III of CITES are classified in categories I, II and III of Law No. 29-05. These lists are periodically updated in accordance with the amendments made to the CITES appendices. Following the entry into force of Law No. 29-05, a national action plan to combat fraud has been developed.²⁰³ The country has also conducted surveys and analysis on:

- The status and trends of Appendix I species occurring in the wild;
- The population status of species listed in Appendix II;
- The effects of any recovery plans on Appendix I species.

With regard to concrete conservation measures or recovery plans for species listed in Appendix 1, the country is implementing:

- A national action plan for the conservation of the northern bald ibis (*Geronticus eremita*);
- An action plan for the conservation of the Barbary macaque (*Macaca sylvanus*);

²⁰⁰ https://ma.chm-cbd.net/implementation/rap_nat/4rnp.c.

²⁰¹ www.onssa.gov.ma/fr/.

²⁰² https://cites.org/sites/default/files/projects/NLP/Decret_application%20loi_29-05_FR.pdf.

²⁰³ <https://cites.org/sites/default/files/reports/15-17Morocco.pdf>.

- A strategy and action plan for the conservation of the Cuvier's gazelle (*Gazella cuvieri*).

Measures aimed at the protection of the European eel (*Anguilla Anguilla*)²⁰⁴ have been put in place, namely, the establishment of the principle of fishing quotas; the framing of the transfer of fishing rights; the prescription of restrictions on the exploitation of glass eels; the implementation of a repopulation programme for the establishment of a traceability system for fishing products at the level of companies with fishing rights; and the fight against poaching and illegal trafficking of the species.

Morocco is also actively involved in capacity-building activities related to the protection of endangered species. In the period 2015–2017, the country has:

- Received training for management authority staff and enforcement staff provided by the International Fund for Animal Welfare;
- Participated in a workshop jointly organized by CITES and UNEP on the legal implementation of CITES, held in 2017 in Abidjan, Ivory Coast;
- Participated in the subregional workshop on the conservation of sharks in the framework of CITES, held in 2017 in Dakar, Senegal;
- Participated in the first meeting of the Group of Experts on the implementation of the strategy on the fight against illegal exploitation and trade of wild flora and fauna species in Africa organized by the African Union, held in 2017 in Addis Ababa, Ethiopia.

Convention on Wetlands of International Importance especially as Waterfowl Habitat

Since 1980, the country has been party to the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) and ratified the Paris Protocol to amend the Convention in 1985. The Department of Water and Forests (the then High Commission for Water, Forestry and the Fight against Desertification) of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests is the designated administrative authority for the Convention. The national focal point of the Convention is appointed from the same institution. The national focal point for the Scientific and Technical Review Group is

appointed from the Scientific Institute of Rabat. Between 2018 and 2019, the country designated 14 new Ramsar sites, bringing the total to 38 Ramsar sites for the country, covering 316,086 ha.²⁰⁵ New sites include:²⁰⁶

- Since 2018, Sebkhath Imlili in the Dakhla-Oued Eddahab region and Merja de Fouwarate in the Rabat-Salé-Kenitra Region;
- Since 2019, Assif Mgoun in the Drâa-Tafilalet region, Assifs Ahançal-Melloul in the Drâa-Tafilalet region, Assifs Réghaya-Ait Mizane in the Marrakesh region, Cap Ghir-Imouane in the Souss-Massa region, Côte Aftissate-Boujdour in the Laâyoune-Sakia El Hamra region, Côte des Bokkoyas in the Tangier-Tétouan-Al Hoceima region, Haut Oued Lakhdar in the Beni Mellal-Khenifra region, Lacs d'Imouzzet du Kandar in Ifrane Province, Lagune et barrage de Smir in the Tangier-Tétouan-Al Hoceima region, Littoral de Jbel Moussa in the Tangier-Tétouan-Al Hoceima Region, Oued Assaquia Al Hamra à La'youne in the Laâyoune-Sakia El Hamra region and Oued Tizguite in the Fès-Boulemane region.

The implementation of the 2017 National Wetlands Strategy 2015–2024 is expected to reinforce international commitments, not only under the Ramsar Convention but also under the CBD and the UNFCCC.²⁰⁷ The main goals and measures of the Strategy are:

- The inclusion of 30 new wetlands in the List of Wetlands of International Importance;
- The implementation of 60 priority integrated wetland restoration action plans;
- The organization of awareness-raising campaigns reaching 50,000 people per year within the framework of the nature animation programme for wetlands;
- The development of four sustainable value chains for wetlands: fishing tourism, integrated aquaculture, bird watching and artisanal fisheries.

For COP14 of the Convention,²⁰⁸ Morocco outlined five priorities for the forthcoming years:

- Formulating policies based on the national wetlands management strategy;

²⁰⁴ <https://cites.org/eng/parties/country-profiles/ma/domestic-measures>.

²⁰⁵ [https://rsis.ramsar.org/rsis-search/?f\[0\]=regionCountry_en_ss%3AMorocco](https://rsis.ramsar.org/rsis-search/?f[0]=regionCountry_en_ss%3AMorocco).

²⁰⁶ https://rsis.ramsar.org/sites/default/files/rsiswp_search/exports/Ramsar-Sites-annotated-summary-Morocco.pdf?1627485921; www.ramsar.org/sites/default/files/documents/pdf/strp/NRC_final_en.pdf.

²⁰⁷ www.ramsar.org/news/morocco-launches-its-national-wetlands-strategy-2015-2024.

²⁰⁸ www.ramsar.org/sites/default/files/documents/importftp/COP14NR_Morocco_f.pdf.

- Developing a wetlands strategic plan involving all municipalities, provinces and regions;
- Implementing integrated action plans for priority wetlands in collaboration with relevant stakeholders;
- Operationalizing the network of Ramsar site managers and thereby harmonizing the management of internationally designated sites;
- Institutionalizing the National Ramsar Committee.

Other committees, such as the Subcommittee on Biodiversity, are also involved and remain major institutional instruments to support the implementation of the Convention at a national level and to disseminate information among relevant stakeholders.

Convention on the Conservation of European Wildlife and Natural Habitats

Morocco acceded to the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) in 2001. The Department of Water and Forests is the national focal point for the Convention. It regularly reports to the Convention, the last biennial report being for the period 2015–2016.²⁰⁹ As at July 2021, no Sites of Biological and Ecological Interest (SBEIs) were added to the Emerald Network.²¹⁰

Convention on the Conservation of Migratory Species of Wild Animals

Morocco ratified the Convention on the Conservation of Migratory Species of Wild Animals in 1993. The Department of Water and Forests has been designated as the management authority of the Convention. In the 2019 National Report, the Government defines the most successful aspects of the Convention regarding wildlife conservation as being:²¹¹

- Release programmes for the dama gazelle (*Nanger dama*) in 2015 and the addax in 2019;
- The launch of wild release and wild population enhancement programmes for the dorcas gazelle (*Gazella dorcas*), Cuvier's gazelle and Barbary sheep (*Ammotragus lervia*).

This success is also reflected by measures for the conservation of birds in Morocco:

- The reinforcement of monitoring by specific eco-guards for the northern bald ibis and the great bustard (*Otis tarda*);
- The ban on visits during the nesting season to the Essaouira Archipelago to protect the Eleonora's falcon (*Falco eleonora*).

Law No. 29-05 includes the prohibition on taking species listed in Appendix I of the Convention from the natural environment, unless authorized by the competent authorities. The country carries out actions to raise public awareness on the value of migratory species, their habitats and migratory systems, mainly through:

- Campaigns on specific themes;
- Educational programmes in schools or colleges;
- Press and media advertising, including social media;
- Celebrations, exhibitions and other community events;
- Engagement of specific stakeholder groups;
- Special publications;
- Interpretation in nature reserves and other sites.

To improve the implementation of the Convention, the Government recognizes the need to develop technical and financial partnerships with international organizations with expertise on migratory species conservation. Regarding international and regional actions and cooperation between States to ensure the conservation and effective management of migratory species, Morocco has undertaken the following measures, among others:

- The exchange of information on raptors that have died through electrocution with international partners, notably with Spain;
- The exchange of visits and experience with several countries and organizations for capacity-building in the management of migratory species, especially large fauna;
- The continued implementation, in consultation with other organizations, of conservation measures for several migratory species such as the northern bald ibis, monk seal and Cuvier's gazelle.

No additional agreements and memoranda in the framework of the Convention other than the ones outlined in the last EPR were ratified.

²⁰⁹ www.coe.int/en/web/bern-convention/biennial-reports.

²¹⁰ www.coe.int/fr/web/bern-convention/emerald-network.

²¹¹ www.cms.int/sites/default/files/document/2019_CMS_National_Report_Maroc_Published.pdf.

United Nations Framework Convention on Climate Change

Morocco ratified the UNFCCC in 1995, the Kyoto Protocol in January 2002 and the Paris Agreement in 2016. The country is a Non-Annex I Party.

The country submitted a first version NDC in 2016²¹² and an updated one in 2021²¹³ for the period 2020–2030, in accordance with relevant provisions of the Paris Agreement. In terms of climate change mitigation, the updated NDC increases the targets of the first NDC by presenting the target of a 45.5 per cent decrease in GHG emissions by 2030 compared with the BAU scenario. This target includes an unconditional target of 18.3 per cent.

The cost of the proposed projects under the NDC is estimated at over US\$78.8 billion,²¹⁴ of which US\$38.8 billion is for mitigation actions and US\$40 billion for adaptation actions. The investments for climate change adaptation are higher than the country has the capacity to finance and Morocco will submit several projects to international financial institutions and donors for consideration. International funding through GEF, GCF and other international donors has already been mobilized to finance projects in the NDC Morocco portfolio.

The country has also developed the National Strategic Adaptation Plan, which aims to support policy makers and stakeholders on the national, regional and local levels to develop and implement, using collaborative methods, effective and coherent policies related to the strengthening of the country's national, economic and social systems' resilience and adaptation capacity to the impacts of climate change. The Plan promotes actions to:

- Reduce the impact of climate change through strengthened institutional capacity (notably through improved knowledge management) at all levels;
- Improve the management of climate change and the development of the more effective and efficient use of resources;
- Develop a convergent approach to climate change adaptation and disaster risk reduction.

Also in the framework of its international commitments under the Paris Agreement, Morocco has developed its Qualitative Low Carbon Strategy to 2050 (LT-LEDS), based on, among other things, the strategic axes of the New Development Model by 2035, the new GHG mitigation ambition of the revised NDC (45.5 per cent by 2030) and the sectoral roadmaps, with a view to achieving climate neutrality during this century. Morocco is preparing the submission of its first qualitative LT-LEDS to the UNFCCC Secretariat under the Paris Agreement.

On the other hand, at this stage, Morocco plans to initiate a second phase related to the elaboration of a more comprehensive quantitative LT-LEDS, which would confirm the long-term reduction target it has set, the sectoral, economic and social objectives, and the tempo of the necessary public policies. This strategy will be broken down into an overall national GHG objective for Morocco in the long term and sectoral decarbonization action plans for seven key sectors, based on a modelling exercise of development and emissions objectives and an analysis of sectoral dynamics, with a view to achieving climate neutrality in this century.

In 2016, the country hosted the 22nd session of the Conference of the Parties in Marrakesh (COP22).²¹⁵ The objective of COP22 was to define an action plan in relation to the signing of the Paris Agreement at COP21, where several initiatives were launched, including the Blue Belt Initiative for ocean and climate resilience.

United Nations Convention to Combat Desertification

Morocco ratified the United Nations Convention to Combat Desertification (UNCCD) in 1996. In 2001, the country adopted the PANLCD. The 10-year Government Programme (2015–2024) includes as a priority the fight against desertification and silting up, as well as the fight against water erosion in mountain areas. According to the UNCCD, the land that is degraded was about 9.6 per cent of the total land area in 2015 (SDG indicator 15.3.1).

Morocco has developed or contributed to developing, implementing or regularly monitoring the following action plans:²¹⁶

²¹² www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco%20First/Morocco%20First%20NDC.pdf.

²¹³ www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco%20First/Moroccan%20updated%20NDC%202021%20Fr.pdf.

²¹⁴ www.environnement.gov.ma/images/2021/rapport/letat_de_levirennement_02.pdf.

²¹⁵ www.un.org/sustainabledevelopment/cop22/.

²¹⁶ prais.unccd.int/sites/default/files/pdf_reports/unccd_Morocco_2018_1.pdf.

- The Regional Coordination Unit (RCU) for Africa of the UNCCD in Rabat;²¹⁷
- The monitoring process of the neutrality of degradation at Oued Maleh led by a multi-disciplinary team.

In addition, the following sectoral strategies have been put in place that take desertification and land degradation into consideration: Green Morocco Plan (PMV), Forests of Morocco 2020–2030 and the SNDD.

Morocco has also put in place appropriate measures to promote and implement ways to combat desertification and land degradation and mitigate the effects of drought:

- Prevention of the effects of desertification/land degradation;
- Relief measures taken once desertification/land degradation has put environmental and/or socioeconomic pressure on ecosystems and/or populations;
- Recovery measures taken once desertification/land degradation has put environmental and/or socioeconomic pressure on ecosystems and/or populations;
- Implementation of sustainable land management practices to address desertification/land degradation;
- Women's engagement in decision-making and the exercise and promotion of their rights.

Convention on Persistent Organic Pollutants

Morocco ratified the Convention on Persistent Organic Pollutants (POPs) (Stockholm Convention) in 2004. The focal point is the Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development.

Following the ratification, the country has requested, within the framework of the Stockholm Convention, an exemption for the use of dichlorodiphenyltrichloroethane (DDT). The country was therefore included in the DDT register in 2005. Since then, the country has:

- Adopted integrated vector management (IVM) as the implementation process of vector control in Morocco;
- Eliminated the stock of DDT held by the then Ministry of Health in 2014;

- Strengthened national capacities in terms of vector surveillance and control, as well as in terms of health and public hygiene pesticide management;
- Developed and implemented an efficacy study of alternative methods to DDT for use at the national level;
- Institutionalization of the National PCB Commission whose mission is to ensure compliance with and implementation of the clauses of the Convention and particularly those relating to PCBs;
- The setting of specific requirements for PCBs waste relating to their collection, transport, storage and treatment with a view to their elimination or recovery, which have been taken pursuant to the provisions of Convention by the adoption of the decree of the Minister for Energy Transition and Sustainable Development No. 782-21 of 13 December 2021;
- Development of the first National Implementation Plan for the Convention in 2006 and its update in 2019;
- Assessment of the regulatory and institutional framework governing POPs;
- Updating of initial POPs inventories (Dioxins and furans, POPs pesticides, PCBs) and creation of an inventory of new POPs;
- Assessment of the impact of POPs on humans and the environment.
- Contribution to the implementation of the Global POPs Monitoring Plan through a first analysis campaign of POPs in the Water and Air matrices carried out by the LNEPS;
- Launch of the realization of a detailed inventory of the chemical product perfluorooctane sulfonic PFOS;
- Continuation of the activities of the project for the elimination of obsolete pesticides including POPs, implemented by FAO and ONSSA.

In 2015, the country notified the Convention of its request to withdraw Morocco from the DDT register.²¹⁸ In 2002, with the support of UNDP and GEF, Morocco implemented a project to meet the country's obligations under the Stockholm Convention.²¹⁹ The main objectives of this were the realization of the National Implementation Plan (NIP) and the National Action Plan (NAP). This first NIP was submitted by Morocco in 2006 and the second

²¹⁷ www.unccd.int/news-events/unccd-regional-coordination-unit-africa-inaugurated-morocco.

²¹⁸ <http://chm.pops.int/Portals/0/download.aspx?d=UNEP-POPS-EXEM-NOTIF-WDRAW-DDT-Morocco.Fr.pdf>.

²¹⁹ www.thegef.org/project/initial-assistance-morocco-meet-its-obligations-under-stockholm-convention-persistent.

NIP in 2019.²²⁰ The main objectives of the 2019 NIP are to:

- Complete the actions carried out following the submission of the initial NIP for the establishment of an adapted regulatory framework integrating the obligations of the Convention;
- Strengthen the monitoring of POPs;
- Continue POP elimination actions;
- Carry out the decontamination of sites identified as contaminated by POPs;
- Improve knowledge of POPs release;
- Establish the rational management of waste containing POPs, in particular, polybrominated diphenyl ethers, hexabromocyclododecane and perfluorooctanesulfonic acid;
- Further reduce dioxin and furan emissions;
- Continue capacity-building, information and awareness-raising actions to cover the area of safe management and disposal of new POPs.

In 2015, the then Ministry of Health, jointly with the FAO, elaborated a four-year project to eliminate obsolete pesticides that include POPs and other derived waste (around 800 tons). This project aimed to get rid of the inventoried obsolete pesticides stocks and put in place a programme that could prevent further accrual of expired stocks. It intended to develop decontamination techniques for soil polluted by the insecticides and apply them on highly polluted sites. It also planned to implement the management of empty pesticide packaging and induce a reduction in the use of chemical pesticides. The overall results of the project and the actions taken have not been assessed.

Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

Morocco became a party to the Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention) in 2011. The Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development serves as the Designated National Authority (DNA) for Industrial Chemicals, and ONSSA serves as the DNA for Pesticides.

Since 2015, the country indicated its non-consent or restrictions to the import of seven additional chemicals listed in Annex III of the Convention and subject to the Prior Informed Consent (PIC) procedure (table 7.1).

In April 2019, Morocco jointly organized, with the Rotterdam Convention Secretariat, FAO Pesticide Risk Reduction Group (AGPMC), UN Women and FAO Office in Morocco, a workshop on national capacity-building on pesticide exposure and vulnerable groups and empty container management for the International Agricultural Exhibition in Morocco (SIAM).²²¹ Impacts of pesticides on human health were discussed, with particular attention paid to vulnerable groups such as women and girls, and capacity-building activities relating to pesticide life-cycle management were organized.

Table 7.1: Non-consent or restrictions by Morocco to import additional chemicals listed in the Convention and subject to the PIC procedure

Case	Chemical name	Party response	Decision	Published date
1563-66-2	Carbofuran	Final decision	No consent to import	12/06/2018
107-06-2	Ethylene dichloride	Interim decision	Consent to import only subject to specified conditions	12/12/2016
75-21-8	Ethylene oxide	Interim decision	Consent to import only subject to specified conditions	12/12/2015
10265-92-6	Methamidophos	Final decision	No consent to import	12/12/2015
298-02-2	Phorate	Final decision	No consent to import	12/06/2021
56-35-9	Tributyl tin compounds	Interim decision	No consent to import	12/12/2015
52-68-6	Trichlorfon	Final decision	No consent to import	12/06/2018

Note: All are pesticides.

²²⁰ <http://chm.pops.int/Implementation/NIPs/NIPTransmission/tabid/253/Default.aspx>.

²²¹ www.pic.int/Default.aspx?tabid=8053.

The outcomes of the workshop were:

- Briefing on pesticide exposure and vulnerable groups, gender gaps and challenges in rural areas in the country and overview on empty container management;
- Five awareness-raising activities aimed at farmers in Morocco;
- Brainstorming on an awareness campaign on empty container management;
- Promotion materials on good and negative pesticide practices, triple flushing, pesticide exposure and impacts on vulnerable groups.

In June 2019, the country organised a second workshop, on training and fostering collaboration among DNAs on the implementation of the Rotterdam Convention in the Maghreb countries: Algeria, Morocco and Tunisia.²²² The aim of this workshop was to provide training for the DNAs of participating countries on their key obligations, to update the implementation of the national action plan for each country, and to develop means to ease trade of chemicals between European Union and Maghreb countries. The outcomes of this workshop were:

- Training on the main obligations of the Rotterdam Convention;
- Knowledge-sharing with regard to tools and forms pertaining to the Convention's implementation;
- Sharing of experience by the DNA of Belgium and a representative of the European Chemical Agency;
- Drafting an action plan for the implementation of the Convention for Morocco and Tunisia.

Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

Morocco ratified the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) in 1995 and approved the Ban Amendment to the Basel Convention in 2004, which entered into force in 2019. The Plastic Waste Amendments took effect in March 2020 in Morocco. The designated competent authority and focal point for the Basel Convention is the State Secretariat to the Minister of Energy, Mines and Sustainable Development, in charge of Sustainable

Development. The latest report is for 2017 (table 7.2).²²³

Morocco has put legislation in place to prevent illegal traffic of hazardous and other wastes, criminalize illegal traffic, restrict the export of hazardous wastes and other wastes for recovery, final disposal and recovery, and restrict the transit of hazardous wastes and other wastes through the country. Furthermore, the country has implemented national strategies and programmes with regard to matters pertaining to the Basel Convention, such as the PNDM, SNRVD and PNVD (chapter 10). Moreover, the Programme of Secure Management of Polychlorinated Biphenyls led to the institutionalization of the National Commission on PCBs, the carrying out of an inventory and analysis of 6,000 transformers likely to be contaminated by PCBs, the setting up of the first platform for the treatment and rehabilitation of electrical equipment contaminated by PCBs, in 2015, and the treatment and elimination of 1,530 tons of contaminated equipment. A second phase of the programme, to remove as much PCB-contaminated equipment as possible and strengthen the regulatory framework for the environmentally sound management of PCBs, was launched in 2018.

Furthermore, measures have been undertaken to reduce the amount of hazardous wastes and other wastes subject to transboundary movement through the creation of the Programme of Secure Management of PCBs. It aims to build national capacity for the management and disposal of PCBs and to establish a local infrastructure for the dismantling and decontamination of PCB-contaminated equipment and oils.

Minamata Convention on Mercury

Morocco is a signatory to the Minamata Convention on Mercury, since 2014. The focal point is the Ministry of Energy Transition and Sustainable Development. The Ministry has participated in the work of the UNEP Mercury Group since 2002 and until the start of the intergovernmental negotiating sessions in 2010. In addition, it was a member in the work of these negotiating sessions and in the meetings of the Arab and African groups.²²⁴

²²² www.pic.int/Default.aspx?tabid=8016.

²²³ <http://ers.basel.int/ERS-Extended/FeedbackServer/fsadmin.aspx?fscontrol=respondentReport&surveyid=75&voterid=49512&readonly=1&nomenclature=1>.

²²⁴ www.environnement.gov.ma/fr/78-cat1/850-convention-de-minamata-sur-le-mercure.

Table 7.2: Generation and transboundary movements of hazardous wastes and other waste, 2017, tons

	Amount	
Generation	Hazardous wastes	
	Hazardous wastes under Art. 1 (1)a (Annex VIII)	
	Hazardous wastes under Art. 1 (1)b	
Exports	Other wastes (Annex II)	6 312 925.00
	Hazardous waste	590.00
	Other waste	Not reported
	Total	590.00
Imports	Hazardous waste (Y17, Y19)	728 969.46
	Other waste	1 246.87
	Total	730 216.33

Source: Basel Convention, 2021.

Note: Y1–Y45 = categories of waste to be controlled.

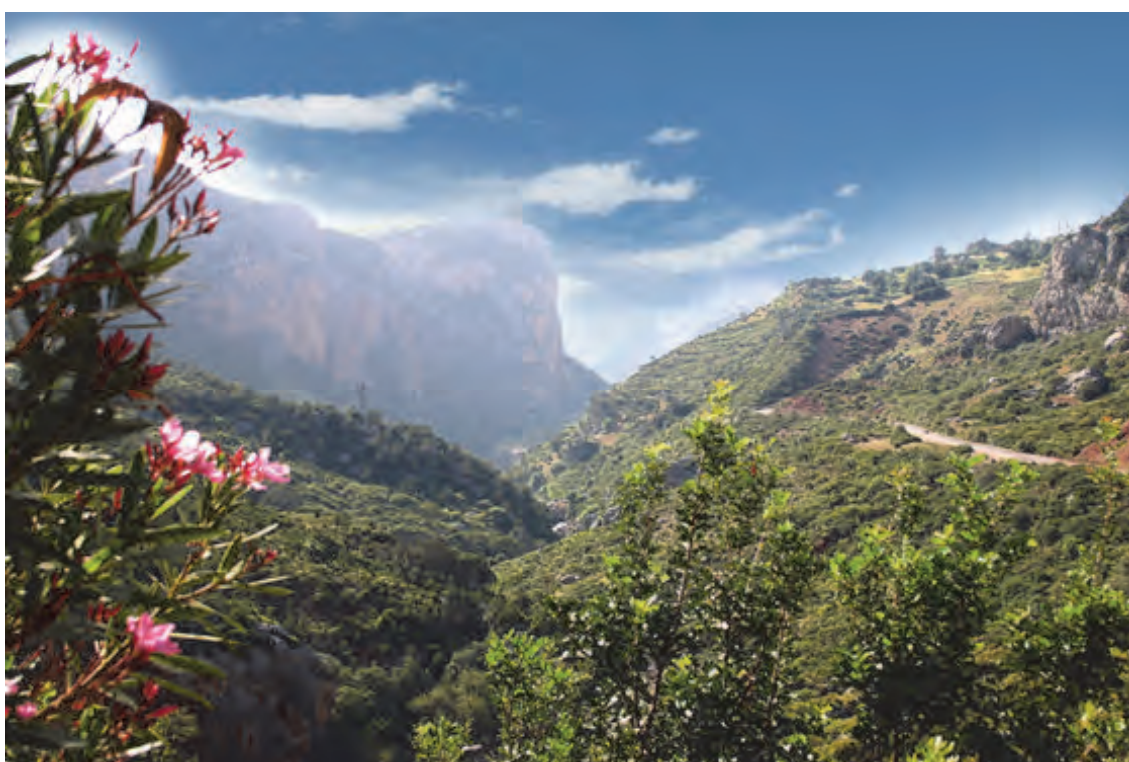
Photo 7.2: Imsfrane, High Atlas

Photo credit: Department of Sustainable Development

The country has also benefited from GEF financing for the realization of a project which aims “to strengthen the national decision-making mechanism for the ratification of the Minamata Convention” implemented by the Department of Sustainable Development in collaboration with UNDP. This project, which was completed in 2020, made it possible in particular to:

- Analysis and evaluation of the institutional and regulatory framework to define a common vision for the sustainable management of mercury and its compounds;
- Initial assessment of use, releases and emissions of mercury with the development of the national mercury profile;

- Realization of an action plan for an ecologically rational management of mercury;
- Awareness and information on the provisions of the Minamata Convention and the impact of mercury on health and the environment;
- Design of a documentary film on the Minamata Convention and the impacts of mercury on the environment and human health;
- The development of an analysis study of the impacts of the ratification of the Minamata Convention and proposals for derogations.

Morocco has demonstrated its commitment to implementing the provisions of the Convention through the following actions:

- Publication of Circular No. 196 DMP 00 in 2010, which bans the marketing and the sale of mercury thermometers;
- The organization, by the Poison Control and Pharmacovigilance Centre of the Ministry of Health and Social Welfare, of a study day, in 2017, on the role of the health sector in Morocco in the implementation of the Minamata Convention;²²⁵
- Publication in 2016 of Joint Ministerial Order No. 1643-16 of the then Minister of Agriculture and Maritime Fishing and the then Minister of Health setting the maximum allowable limits of contaminants, including mercury, in primary products and food products;
- Draft a dental strategy, including the elimination of mercury-based dental amalgam.

Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean

Morocco is party to the Barcelona Convention and its Protocols, except the amendments to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Reporting is required every two years, and to date, Morocco has delivered the reports in a timely matter. The implementation reports of Morocco are not made available on the Convention's website.

Morocco has been active on the Protocols concerning SPAs and Biological Diversity Protocol and on Integrated Coastal Zone Management in the Mediterranean. In the context of the former Protocol, the following SPAs were identified: Cap des Trois Fourches, Al Hoceima National Park, the Alboran area and Jbel Moussa. With the support of the Regional Activity Centre for Specially Protected Areas, a planning and management plan of the Jbel Moussa protected area was elaborated in 2019.²²⁶

The 2015 Law No. 81-12 on the Coastal Zone requires the preparation of an action plan and regional schemes on the coastal areas. The National Plan for the Coastal Zone was elaborated, validated by the National Commission on Integrated Coastal Zone Management in 2020, but has yet to be adopted. The Rabat-Salé-Kenitra Region hosted the pilot project for design of the typical regional coastal scheme (chapter 12).

A comparison between the provisions of Law No. 81-12 and those of the Protocol shows that national

provisions partially cover the international provisions, in particular regarding the:²²⁷

- Protection of people, investments and the environment from the consequences of climate change;
- Dynamic process of management and sustainable exploitation;
- Fragility of ecosystems and of coastal landscapes.

Over the period July 2017–July 2018, Al Hoceima National Park received financing through the MedFund: Environmental Fund for Mediterranean Marine Protected Areas (MPAs).²²⁸ For the period 2016–2017, Morocco took part in the pilot edition of the Simplified Peer Review Mechanism of national strategies on sustainable development under the Barcelona Convention.

To support the implementation of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities, a national baseline assessment based on information and data for the report for two regions was carried out. Approximately 40 indicators for monitoring land-based pollution were identified.

Morocco participates in the programme to monitor the extent of pollution of its Mediterranean coastal areas (MEDPOL). The pollution surveillance is organized on the basis of potential sources of pollution in certain areas. The analysis of data is organized twice per year. LNESP is responsible for monitoring land-based pollution under MEDPOL and land-based pollution in the Atlantic Ocean (ATLANTIQUE-POL).

Contracting parties of the Barcelona Convention have a series of commitments to engage other stakeholders and the public. This participation is also supported by the Action Plan of the Mediterranean Strategy on Education for Sustainable Development.

In 2012, a five-year project of the World Bank began, aimed at the integrated management of coastal areas. The project contributed to strategic action plans developed under the Mediterranean Strategy for Sustainable Development by reinforcing coastal communities' resilience to climate change and supporting regional efforts to fight against the decline of biodiversity and fish stock. It is reported that the project improved women's lives and increased the

²²⁵ www.sante.gov.ma/Pages/Communiqués.aspx?IDCom=223.

²²⁶ www.rac-spa.org/publications#enmedkey.

²²⁷ <https://revues.imist.ma/index.php/JEMED/article/download/20197/10969>.

²²⁸ <https://ufmsecretariat.org/project/medfund/>.

revenues of fishers and farmers involved in the project.²²⁹

In 2019, another project on integrated management of coastal areas was started with the World Bank, to support the sustainable and coherent development of the coastal area of Rabat-Salé-Kenitra.²³⁰ The project is run in the framework of the “European Support Mechanism for Integrated and Sustainable Water Management”. On the basis of the findings of a diagnosis phase and on feedback from stakeholders, the World Bank team designed a roadmap with a 2040 time horizon to meet the region’s long-term coastline development objectives. The establishment of an integrated coastline governance model, in compliance with national strategies, and the preservation and rehabilitation of the coastal ecosystem through critical investments are among the main objectives. The plan also provides for initial priority investments that will cover activities including organizing the artisanal fisheries sector and training fishers on best practices. Investments are expected to support the environmental rehabilitation of coastal wetlands, construction of wastewater treatment plants in selected localities, biological stabilization of dunes, and recycling and valorization of plastic waste.

Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area

Morocco ratified the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS) in 2001. The INRH has a specific scientific programme of monitoring cetacean strandings.

In the period 2013–2016, Morocco was Chair of ACCOBAMS. From 2020 to 2022, Morocco will be a Bureau member. Morocco is regularly attending meetings and the ACCOBAMS Secretariat cooperates well with the INRH.

Morocco is facing problems with the interaction between fishers and cetaceans, especially with great dolphins attacking and “stealing” fish from fishing nets, risking being wounded or killed, and the consequent economic effects on fisheries (loss of fish, damaged nets and repairs being too costly). Since 2016, ACCOBAMS has been supporting the country to resolve the issue. The European Union also funded

several projects. Pilot projects were being run in the ports of M’Diq and Al Hoceima.

ACCOBAMS is also supporting Morocco on by-catches (usually sharks, turtles and birds). The country was piloting observation and monitoring on boats, with 15 observers. The preliminary results, analysed at the end of 2020, reported that Morocco had very few episodes of by-catches. A by-catch project aimed at preparing a national strategy on by-catches started in 2017.²³¹

Between 2015 and 2020, there were approximately 119 strandings per year, 35 per cent of which were due to the consequences of human activities. In 2016, another project on integrated surveillance of cetaceans was implemented. One scientific expert and five technicians were devoted to the project. The team ran boat- and air-based monitoring, which provided a good opportunity to also monitor pollution and the presence of debris.

In 2018, in Tangier, the ACCOBAMS Secretariat organized an awareness workshop on the project “Towards the development of responsible whale watching activities and pescatourism in Morocco” in cooperation with the Fisheries Department of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests.²³² The aim of the workshop was to present whale watching and pescatourism activities and the stakes involved in their development, including, from the institutional perspective, to ensure respectful and responsible practices and to consider alternatives for impacted fishing activities.

NGOs are involved by the Secretariat of ACCOBAMS according to the agreed proceedings.

Conventions under the International Maritime Organization

In 2013, Morocco ratified the 2007 Nairobi International Convention on the Removal of Wrecks (Wreck Removal Convention). In 2015, Morocco ratified the 2004 International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention). In 2016, Morocco ratified the International Convention on Salvage (1989) and the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes

²²⁹ <https://documents1.worldbank.org/curated/en/292031531334849750/text/ICR00004494-07062018.txt>.

²³⁰ www.worldbank.org/en/news/feature/2021/01/13/preserving-moroccos-coastline.

²³¹ www.rac-spa.org/bycatch_pr.

²³² <https://accobams.org/awareness-workshop-towards-development-whale-watching-responsible-activities-pescatourism-morocco/>.

and Other Matter 1972 (London Convention). Morocco has not submitted any designation for the International Maritime Organization (IMO)'s Marine Particularly Sensitive Sea Areas.²³³

In 2016, Morocco hosted a workshop promoting energy efficiency measures and the control of GHG emissions from ships. Several government representatives attended, along with representatives of port authorities and marine training institutes. In 2018, a workshop on port emissions was hosted in Casablanca by the Merchant Marine Directorate and the National Ports Agency. Participants were better equipped to quantify emissions in ports through the development of port emissions assessments (both ocean and land based, including emissions from cargo handling equipment, trucks and railway operations) and benefit from guidance on how to develop strategies for reducing emissions in ports.

In January 2021, the adoption of Law No. 69-18 on Pollution by Ships was the major step towards implementing the IMO conventions. The Law introduces sanctions on pollution caused by ships by integrating into the national legislation the provisions of the IMO conventions. It also covers the protection of ocean, marine ecosystems and fish.

Sendai Framework for Disaster Risk Reduction

The National Strategy of Natural Disaster Risk Management is in accordance with the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030. According to the African Union's Report on Disaster Risk Reduction 2015–2018: North Africa Countries,²³⁴ Morocco does not have legislation or policies that seek to: address the global and continental DRR target to incorporate DRR in the country's educational system at all levels; reduce damage to critical infrastructure and disruption of basic services by disasters; or improve availability and access to early warning systems by the country's population. However, a Programme of Integrated Management of Natural Disaster Risk and Resilience was approved in 2016.²³⁵

In this context, Morocco progressed its risk-informed preparedness planning by updating its contingency planning and conducting periodic testing every two

years. The tests are a simulation of accidents on marine and terrestrial areas, called "SIMULEX". The simulation is organized in the framework of the National Emergency Plan for the Preparation and Fight Against Accidental Marine Pollution. SIMULEX exercises were conducted at Tangier-Med port in 2014,²³⁶ off the coast of Nador in 2016 and in Agadir in 2018 to assess the National Contingency Plan. As at August 2021, no information was available on exercises in 2020, although funds were reserved for them.²³⁷ As part of its decentralization policy, Morocco has introduced community-based DRR management activities (community maps, training on construction standards and community early warning systems). The multi-hazard Weather Alert System, in place since the 1990s, is being constantly updated. A Flood Risk Management System is also part of its National Strategy of Natural Disaster Risk Management.

In past decades, earthquake risk was predominant in Morocco. More recently, with rapid urbanization, population increase and industrialization of cities, Morocco has become more vulnerable to hydro-meteorological hazards, such as floods, landslides, drought, sandstorms and forest fires. Coastal cities are also more and more vulnerable to the adverse effects of climate change. It is also foreseen that the proportion of the country's territory occupied by urban areas will increase from 0.22 per cent in 2010 to 0.99 per cent in 2030.²³⁸ Morocco has seen also an increase in technological risks, due to polluting industries whose operations might have an impact on human health or the environment.

The urban population is expected to increase by 4 million by 2025. As at August 2021, 60 per cent of the population lives in urban areas. With the support of the Japan–World Bank Programme for Mainstreaming Disaster Risk Management in Developing Countries, Morocco took steps to prepare cities to better respond to disasters, in agreement with the Sendai Framework priorities. In the period 2018–2020, Morocco received a grant of US\$400,000 to support resilience-building technical assistance and capacity-building initiatives. The cities of Fès and Mohammedia were involved and gained a clearer view of risk factors and potential threats they faced. The project was replicable to other cities and helped mobilize US\$200 million of

²³³ www.imo.org/en/OurWork/Environment/Pages/PSSAs.aspx.

²³⁴ <https://reliefweb.int/report/libya/report-disaster-risk-reduction-2015-2018-north-africa-countries-addendum-biennial>.

²³⁵ www.gestionrisques.ma/.

²³⁶ www.environnement.gov.ma/PDFs/simulex_2014_Jorf_Lasfar.pdf.

²³⁷ <http://lof.finances.gov.ma/sites/default/files/budget/files/environnement.pdf>.

²³⁸ www.environnement.gov.ma/images/2021/rapport/letat_de_levironnement_02.pdf.

additional financing for resilient investments from the World Bank in Morocco.²³⁹

According to the Sendai Framework Monitoring System, Morocco's score for adoption and implementation of national DRR strategies in line with the Sendai Framework was 0.6 in 2016 and 0.7 in 2019 (SDG indicators 1.5.3, 11.b.1 and 13.1.2), showing a positive trend towards achieving this indicator. However, while Morocco implemented several measures to respond to crises, a national strategy for integrated risk management is still lacking.

Convention concerning the Protection of the World Cultural and Natural Heritage

Nine properties are inscribed on the World Heritage List: Ksar of Aït-Ben-Haddou (1987), the Medina of Essaouira (Ancient Mogador) (2001), the Medina of Fès (1981), the Medina of Marrakesh (1985), the Medina of Tétouan (Ancient Titawin) (1997), Rabat, Modern Capital and Historic City: A Shared Heritage (2012), the Archaeological Site of Volubilis (1997), the Historic Town of Meknès (1996) and the Portuguese City of Mazagan (El Jadida) (2004).

Convention on the Protection of the Underwater Cultural Heritage

Morocco was elected Chair of the Scientific and Technical Council of the Convention on the Protection of the Underwater Cultural Heritage in May 2017.

Convention for the Safeguarding of the Intangible Cultural Heritage

The elements included in the List of Intangible Cultural Heritage and the Register of Good Safeguarding Practices are: Arab calligraphy (2021) (joint dossier); Falconry, a living human heritage (2021) (joint dossier); Tbourida (2021); Knowledge, know-how and practices relating to the production and consumption of couscous (2020) (joint dossier); Gnaoua (2019); Knowledge, know-how, traditions and practices relating to the date palm (2019) (joint dossier); Taskiwin, martial dance of the Western High Atlas (2017, requiring urgent protection); The argan tree, practices and know-how related to the argan tree (2014); the Mediterranean diet (2013) (joint dossier); the Sefrou cherry festival (2012); the cultural space of

Jemaa el-Fna square (2008); and the Moussem of Tan-Tan (2008).²⁴⁰

The document on “knowledge related to Khethara” is being prepared for inclusion in the List of Intangible Cultural Heritage.

Islamic World Educational, Scientific and Cultural Organization

The Oasis of Figuig is on the List of Islamic Heritage of the Islamic World Educational, Scientific and Cultural Organization. The monuments and archaeological sites proposed for inscription on the List are Talassemtane National Park, the Ajjal Dragonier Area, Khnifiss Lagoon and Dakhla National Park.

7.3 International cooperation

European Union

The European Union and Morocco signed an association agreement in 1996, which entered into force in 2000. The agreement constitutes a legal framework for relations, in particular, on environment and sustainable development, between the European Union and Morocco. In 2008, Advanced Status was granted to Morocco. The European Union and Morocco also began negotiations concerning the creation of a European Union–Morocco Deep and Comprehensive Free Trade Agreement (DCFTA) in 2013. In 2021, the European Union offered to discuss modernizing trade and investment relations with Morocco, to better adapt them to today's challenges.²⁴¹

Some instruments allow for financial and technical cooperation between Morocco and the European Union. The Competitiveness and Green Growth Support Programme (PACC)²⁴² runs from 2016 to 2022 and aims to improve Morocco's growth and competitiveness, in particular by removing constraints to competitiveness in the country, notably by strengthening the implementation of the Moroccan industrial policy contained in the Industrial Acceleration Plan 2014–2020, facilitating access to the European market for private sector operators in Morocco, and supporting the development of a green, low-carbon economy by ensuring institutional and legal convergence between the country and the EU and supporting the implementation of the SNDD. In the

²³⁹ www.gfdrr.org/en/publication/results-resilience-integrated-disaster-risk-management-morocco.

²⁴⁰ [https://ich.unesco.org/fr/listes?country\[\]=00137&multinational=3&display1=inscriptionID#tabs](https://ich.unesco.org/fr/listes?country[]=00137&multinational=3&display1=inscriptionID#tabs).

²⁴¹ <https://ec.europa.eu/trade/policy/countries-and-regions/countries/morocco/>.

²⁴² <https://eeas.europa.eu/delegations/morocco/92481/programme-d%E2%80%99appui-%C3%A0-la-comp%C3%A9titivit%C3%A9-et-%C3%A0-la-croissance-verte-soutien-au-statut-de-l-fr>.

framework of the Sustainable Water Integrated Management and Horizon 2020 Support Mechanism (SWIM-H2020 SM) on the depollution of the Mediterranean,²⁴³ Morocco has participated in activities to raise awareness and build national capacities (of administrations, local authorities and NGOs) on environmental issues. The ClimaSouth project facilitates access to climate finance for Moroccan companies developing projects related to climate change mitigation and adaptation.²⁴⁴ The SWITCH Med²⁴⁵ regional project (2012–2016) supported the transition to more sustainable consumption and production patterns in the Mediterranean (€20 million). The Shared Environmental Information System (ENPI-SEIS) project (2013–2020) contributed to the development of a Shared Environmental Information System (SEIS).²⁴⁶ Under the Neighbourhood, Development and International Cooperation Instrument for the period 2014–2020, European Union finance to Morocco amounted to €1.4 billion.

In 2021, the European Commission adopted a new Agenda for the Mediterranean to reinforce the partnership in the region. The Commission also announced the creation of an Economic and Investment Plan for the Southern Neighbours to ensure recovery following the COVID-19 pandemic. Support for green transition, renewable energy, energy efficiency and resource efficiency, such as water use, are among the targeted areas of intervention. Morocco could expect support from the European Union–Morocco Green Partnership as a means to achieving a sustainable economy.²⁴⁷

Selected bilateral agreements

France

The National Institute of Archaeology and Heritage Sciences (NIAHS) of the then Ministry of Culture, Youth and Sports organized a symposium on Heritage and Climate Change over a Million Years from 21 to 23 October 2015 in Rabat, in collaboration with the National Museum of Natural History in Paris and the University of Quebec in Montreal. It brought together more than 60 researchers from Algeria, Canada, France, Italy, Morocco, Senegal and Tunisia. The symposium concluded that archaeological sciences

provide scientific data on these changes and their consequences. They are thus helping to make predictions about the rise in temperatures that the Earth is currently experiencing. The objectives of the conference were to:

- Increase the number of interdisciplinary meetings involving high-level specialists from various scientific backgrounds;
- Illustrate the effects of climate in the past and their impact on settlement patterns and heritage, using different proxies;
- Raise awareness among the various actors of the challenges of conservation and study of cultural heritage in all its forms, in particular the heritage of Morocco;
- Take stock of the global importance of the Maghreb concerning the origins and evolution of modern humans;
- Reinforce and boost scientific and technical collaborations between Moroccan laboratories and those of the participating countries;
- Present the contributions of archaeology to the modelling of current and future climate change.

Germany

GIZ has been operating in Morocco on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) since 1975, and since 2012 has supported or currently supports the following four projects:

- Project “Support for the implementation of the 2030 Agenda for Sustainable Development in Morocco” aims to strengthen the role of the Department of Sustainable Development, as well as public sector actors (sectoral ministries, regional institutions), the private sector and civil society in the implementation of the SNDD and the 2030 Agenda and its 17 goals, for which it provided €2 million over two years (2020–2021);
- Environmental and climate governance project “PRO GEC”: 2016–2020, which aims to support the Department of Sustainable Development and its partners in the adoption and implementation of governance tools and approaches to achieve the objectives of the SNDD;

²⁴³ www.euneighbours.eu/en/south/stay-informed/projects/swim-h2020-sm-sustainable-water-integrated-management-and-horizon-2020.

²⁴⁴ www.climasouth.eu/?refresh=01.

²⁴⁵ https://ec.europa.eu/environment/marine/pdf/SWITCH-MED_project.pdf.

²⁴⁶ www.eea.europa.eu/fr/publications/vers-un-systeme-de-partage.

²⁴⁷ https://ec.europa.eu/clima/news/eu-and-morocco-form-green-partnership-energy-climate-and-environment-ahead-cop-26_en

- Climate Change Competence Centre (4C-Morocco) support project 2013–2019, which aims to strengthen Morocco’s capacity to adapt to climate change and mitigate GHG emissions;
- Ecosystem services project: 2018–2020, with the main objective of strengthening the value of biodiversity and ecosystem services in environmental policies.

Germany also contributed to environmental and climate governance for the period 2016–2020 with approximately €8 million, of which €3.5 million was earmarked for COP22.²⁴⁸

Italy

Italy and Morocco have been cooperating since 2000. As at July 2021, this cooperation is manifested through the implementation of the technical agreement on environmental protection and sustainable development. This agreement was signed in April 2016 between the then Department of the Environment and the Italian Ministry of the Environment, Land and Sea. Within the framework of this agreement, the Italian Ministry is providing financial support to Morocco of €3.2 million for technical assistance, capacity-building and pilot projects in the field of the environment and sustainable development.

Italy is also contributing, together with the World Bank, to a project to implement the integrated management of coastal areas and for the prevention and control of marine pollution for the Rabat-Salé-Kenitra Region. Italy alone provided €500,000 for the project, which started in December 2019. On cultural and natural heritage, Italy also contributes to the financing of:

- Archaeological excavation and survey projects carried out by the NIAHS, the Faculty of Humanities of Mohammedia University and their counterparts at Cassino University in Italy. The results of this scientific research were published in *The Rif Coastline: Moroccan-Italian Archaeological Investigations* (2019), which details the results of six seasons of archaeological excavations;²⁴⁹
- The Moroccan–Italian programme for the conversion of debt into public investment for the protection of the cultural heritage of the coastline, which consists of the realization of development works, topographical studies and a visit circuit at the archaeological site of Lixus in Larache, and

architectural studies and monitoring of the restoration and conservation works of the Merinid medersa at the Chellah site in Rabat.

Portugal

The Department of Culture (Directorate of Cultural Heritage) and the Faculty of Social Sciences and Humanities of the University NOVA, Lisbon, are cooperating in the framework of the cultural and scientific collaboration between Morocco and Portugal on exchange of experiences, scientific research, and development of the archaeological sites of Ksar Sghir in Fahs-Anjra Province and Tamuda in Tétouan Province. Cooperation between Morocco and Portugal on environment and sustainable development is governed by a 2007 cooperation agreement. To revitalize this cooperation, exchanges are underway between the Departments in charge of environment and sustainable development of the two countries through diplomatic channels, for the signing of a new MoU taking into consideration the new global and regional challenges in this area, as well as the priorities of the two countries in this context.

Peru

Cultural exchanges with Peru have been strengthened in the field of natural heritage conservation. A photographic exhibition, “Natural Protected Areas of Peru”, was organized at the Mohammed V Theatre, Rabat, on 1 October 2019 to inform people about the Third International Congress of Protected Areas of Latin America and the Caribbean, which took place in Lima, Peru, 14–17 October 2019.

South-South Cooperation

The collaboration between the countries of the South is mainly focused on the transfer of knowledge, exchange of experience and technical assistance, and development of projects in various environmental fields.

Within the framework of South-South cooperation on environment and sustainable development, 26 agreements have been signed. These include 12 agreements with African countries, which have been a priority axis of Morocco’s foreign policy for several years.

As an example of South-South cooperation, the Competence Centre for Climate Change (4C-Morocco) supported more than 35 African countries

²⁴⁸ <https://open.undp.org/projects/00096480>.

²⁴⁹ <https://www.minculture.gov.ma/fr/?p=12858>.

within the Climate Commission of the Congo River Basin and the Climate Commission of Sahel. Both Commissions had been established at Morocco's initiative. Morocco contributes to the creation of a blue fund for the Climate Commission of the Congo River Basin.²⁵⁰

In 2016, Morocco launched the Adaptation of African Agriculture to Climate Change (AAA) initiative.²⁵¹ This focuses on food safety in Africa by promoting agricultural practices for adaptation to climate change. The Initiative has partnered with other organizations at the international and regional levels, for instance FAO and the African Development Bank (ADB). The Foundation for the Adaptation of African Agriculture to Climate Change was created to manage the Initiative.

In 2017, the country was reintegrated into the African Union and expressed its interest in becoming a member of the Economic Community of Western African States. These actions reinforced the African policy of Morocco. Morocco is also involved in the Arab Organization for Agricultural Development.

On heritage, Morocco hosted the 15th edition of the Pan-African Congress of Archaeology and Associated Disciplines (PanAf) from 10 to 14 September 2018 in Rabat, on the theme "Valorization of African Cultural Heritage and Sustainable Development", organized in partnership between the Department of Culture (NIAHS) and the then Ministry of National Education, Vocational Training, Higher Education and Scientific Research and University Mohammed V of Rabat.

United States of America

The Free Trade Agreement signed in 2004 by the United States of America and Morocco governs cooperation between the two countries on the environment and sustainable development. At the same time, the countries signed a Joint Declaration for cooperation in this field, which is translated into action plans whose execution is ensured by the American Environmental Protection Agency. Three action plans have been signed since 2005 and, as at July 2021, a fourth plan is currently being signed. The countries are cooperating in the following areas:

- Capacity-building in environmental regulations;
- Encouraging the development of incentives and voluntary mechanisms;
- Promoting public participation in environmental protection efforts and improving public access to environmental information and justice;
- Protecting coastal areas and estuaries and prevention of the abusive exploitation of fishery resources;
- Safeguarding important natural resources such as water and protected areas;
- Promoting the development of the business sector in environmental technologies.

Others

The country has developed, since 2000, 34 cooperation agreements and memoranda of understanding, with eight countries of the global North and 26 countries of the global South.²⁵²

The National Institute of Fine Arts (INBA) has developed a programme called "Arts and Crafts" as part of a European project involving Belgium (Brussels), Canada (Quebec), France (Saint Etienne), Morocco (Tétouan), Portugal (Porto) and Slovakia (Bratislava). This programme aims to recover ancestral knowledge of traditional arts or crafts and their development in the field of design and innovation. The programme takes into consideration the human side (support of craftsmen) and the environmental side (nature-friendly practices).

Selected international financial assistance

In its report on activities for the period 2017–2020,²⁵³ the then Ministry of Energy, Mines, Water and Environment reported the continuation of its efforts to strengthen relationships through multilateral and bilateral cooperation. In the same document, the Ministry reported having mobilized, from 2017 to 2020, US\$230 million from different partners, funds and donors, such as UNEP, UNDP, GEF, GCF and the World Bank. The aid received was used to prepare draft projects, capacity-building activities, technology transfer and investment in the fields of the environment and sustainable development.

²⁵⁰ www.environnement.gov.ma/fr/component/content/article/134-actualites/3412-le-centre-de-competences-en-changements-climatiques-renforce-son-action-d-appui-aux-politiques-de-lutte-contre-les-changements-climatiques-au-maroc-et-en-afrique.

²⁵¹ www.aaainitiative.org/

²⁵² www.environnement.gov.ma/images/actualites/Coop%C3%A9ration_bilat%C3%A9rale/Liste_des_Accords_de_coop%C3%A9ration_bilat%C3%A9raux.pdf.

²⁵³ www.environnement.gov.ma/fr/3669.

Global Environment Facility

Morocco is a member of a constituency comprised of Algeria, Egypt, Morocco and Tunisia. The Department of Sustainable Development serves as the national focal point of GEF. Since the accession of Morocco to GEF, 93 national projects and 3 regional projects have been funded (table 7.3). During the 7th phase of replenishment of GEF funds, Morocco was able to benefit from a grant through the Transparent Resource Allocation System (TRAS) of \$10 million. Over projects have also been approved under the supplementary funds as well as the microfinancing programme.

According to the TRAS for Transparent Allocation of Resources, a total of \$30 million was already utilized, of which approximately 36 per cent has been allocated to the climate change focal area, 3 per cent to the biodiversity focal area and 6 per cent to the land degradation focal area.

Additional allocations remain to be programmed, for a total amount of \$100 million. These additional funds are expected to be distributed to previously defined focal areas in the same proportions.

World Bank

Morocco and the World Bank have developed the Country Partnership Framework for Morocco (CPF) which includes the objectives of the 10th and the Government Programme and Medium-Term Strategy (MTE). The CPF aims to develop systematic, evidence-based and country-driven models with the goal of ending extreme poverty and increasing shared prosperity in a sustainable manner. In February 2019, the World Bank concluded a new CPF with Morocco for the main aim of the Framework is to define areas in which the World Bank Group could engage to support Morocco's long-term development goals. The document builds upon the priorities of the Government Programme (2015-2020).

Table 7.3: Funding received by Morocco under GEF, US\$

Trust fund	Project type	Number	Financing	Co-financing
Global Environment Facility	National	3	20	10
	Regional/Global	3	8	4
Special Climate Change Fund	National	3	7	0
	Regional/Global	1	10	4
Capacity-building Initiative for Transparency	National	1	10	0
	Regional/Global	0	0	0

Source: Morocco: Country Partnership Framework, accessed 11/10/2019, thegef.org/country/morocco

Photo 7.3: Moroccan mint tea



Photo credit EEF/Am

In the case of Morocco, the CPF focuses on the following objectives: (a) promoting job creation by the private sector; (b) strengthening human capital; and (c) promoting inclusive and resilient territorial development. In addition to the CPF, the World Bank supports the economic recovery of Morocco, following the impact of the COVID-19 crisis, on various themes (table 7.4).

In June 2021, the World Bank approved funding of US\$100 million, in addition to funds previously provided, to strengthen Morocco's ability to address the impacts of natural disasters. The funds will be added to existing funding for the Integrated Disaster Risk Management and Resilience Program.²⁵⁴

Table 7.4: Funds disbursed by the World Bank, percentage

	%
Rural services and infrastructure	20.7
Urban services and housing for the poor	9.6
Water resource management	9.6
Infrastructure services for private sector development	9.1
Participation and civic engagement	9.1
Environmental policies and engagement	8.6
Micro, small and medium enterprise support	8.6
Regulation and competition policy	8.6
Gender	8.1
Pollution management and environmental health	8.1

Source: World Bank, Projects:

https://projects.worldbank.org/en/projects-operations/projects-summary?countrycode_exact=MA&os=0, accessed July 2021.

The World Bank is also working with Morocco on urbanization, with the Morocco Municipal Performance Programme, co-financed by AFD.²⁵⁵ The Programme supports 97 urban municipalities with a combined population of 18 million (more than 80 per cent of Morocco's urban population) and is led by the General Directorate for Local Authorities of the Ministry of the Interior. The Programme supports municipalities to deliver quality services and infrastructure, while improving their revenue and investments. The World Bank reports that the Programme, started in April 2020, was already showing results. The Ministry of the Interior put in place capacity-building activities in areas where municipalities expressed the need for support. However, the training was being delivered virtually because of COVID-19.

The World Bank also supported Morocco with loans. For instance, it granted US\$300 million for a project running from 2016 to 2017 and aiming to support the Government's green growth agenda, with the objectives of improving the management of natural capital, greening physical capital, and strengthening and diversifying the rural economy by leveraging human capital.

Islamic Development Bank

The Islamic Development Bank (IsDB) has financed 246 projects in Morocco for total funding of US\$6.9 billion, of which energy accounts for the lion's share at almost 52 per cent (table 7.5). Of 246 projects, 215 have been completed and 31 are still active.

Table 7.5: IsDB Funding in Morocco, percentage

	%
Energy	51.7
Trade	1.0
Transport	5.8
Industry and mining	17.9
Education	7.7
Water, sanitation and urbanization	10.1
Health and social services	4.8
Information and communication	1.0

Source: www.isdb.org/morocco, accessed July 2021.

European Investment Bank

Morocco has worked with the EIB since 1979. The EIB has financed 129 projects, for a total of €8.64 billion.²⁵⁶ Investments by the EIB in Morocco focus on:

- Support for sustainable climate investments;
- Provision of liquidity for micro, small and medium-sized enterprises;
- Reinforcement of finance and microfinance institutions, particularly with regard to vulnerable populations such as girls and women.

Additional funding has been provided to Morocco in the context of the COVID-19 crisis, with funding contributing to better health services and working conditions. The EIB also supports Morocco through the Economic Resilience Initiative (ERI).²⁵⁷ A recent example of this support is the €500,000 grant to the Euromed University provided by the EIB during the COVID-19 crisis to finance 3D printers used in the

²⁵⁴ www.worldbank.org/en/news/press-release/2021/06/11/building-morocco-s-resilience-to-natural-and-climate-related-disasters-world-bank-additional-financing-to-protect-against.

²⁵⁵ www.worldbank.org/en/news/feature/2020/10/21/morocco-decentralizing-and-modernizing-urban-management.

²⁵⁶ www.eib.org/en/projects/regions/med/morocco/index.htm.

²⁵⁷ www.eib.org/en/products/mandates-partnerships/eri/index.htm.

production of medical masks for hospitals and IT equipment for 422 scholarship students.

African Development Bank

Morocco has worked with the ADB since 1970. At the end of 2020, 36 projects financed by the ADB were still active, for a total amount of over US\$3.8 billion.²⁵⁸ The main focal areas are energy (31 per cent), multisectoral operations (22 per cent), social and human development (13 per cent), the private sector (13 per cent), water and sanitation (10 per cent), transport (9 per cent) and agriculture (2 per cent).

United Nations Development Assistance

The cooperation between Morocco and the United Nations in the country covers the following areas, among other matters:

- Support in elaborating strategies;
- Reinforcement of institutional, juridical and technical capacities;
- Implementation, follow-up and evaluation of projects with components related to the environment and sustainable development;
- Integration of sustainable development and sectoral strategies.

The United Nations Development Assistance Framework (UNDAF) is coordinated in Morocco by a Joint Steering Committee, which is composed of representatives of the Ministry of Foreign Affairs, African Cooperation and Moroccan Expatriates and the Resident Coordinator of the United Nations in the country.²⁵⁹

United Nations entities in Morocco supported the country in the preparation and organization of COP22, especially for side events and the mobilization of international and high-level experts. Support was also provided to Morocco by mobilizing financial resources of more than US\$4.5 million, including contributions from Canada, Italy, Sweden and the European Union.

Green Climate Fund

The Green Climate Fund (GCF), created under the UNFCCC, has been operational since 2014 to support the transfer of funds targeting reduction in GHG emissions from developed economies to developing countries. After the adoption of the Paris Agreement

in 2015, the GCF has been supporting the achievement of the objective of keeping global warming below 2°C. Morocco was able to implement six projects thanks to the GCF.

European Bank for Reconstruction and Development

In Morocco, the EBRD has financed several credits for projects dealing with energy efficiency. In 2020, the EBRD organized a webinar on “A green recovery: EBRD and European Union green investments in the Moroccan private sector”. It was attended by more than 200 representatives of the private sector, together with representatives of the then Ministry of Energy, Mining and the Environment and other relevant ministries. Since 2012, the EBRD has invested almost €2.949 million in the country.²⁶⁰

Evaluation of international environmental projects

Within the framework of monitoring and evaluation of its performance on international cooperation, the Department of Sustainable Development is carrying out an evaluation study of international cooperation on the environment and sustainable development. The purpose of this study is to define the best ways to mobilize technical and financial resources as well as to improve collaboration and partnerships that support the implementation of the national environmental and sustainable development policy, especially at the territorial level.

7.4 Legal, policy and institutional framework

Legal framework

The 2014 Decree No. 2-14-758 stipulates that the Department of Sustainable Development is also in charge of representing the Government during bilateral or multilateral negotiations in the framework of environmental protection and sustainable development.

The 2019 Decree No. 2-19-452 established the National Commission on Sustainable Development under the Head of Government. The Commission is in charge of monitoring the implementation of the SDGs. The Decree also designated the HCP as the competent body to prepare yearly assessments on the implementation of the SDGs.

²⁵⁸ www.afdb.org/en/countries/north-africa/morocco/morocco-and-the-afdb.

²⁵⁹ <https://morocco.un.org/ft/20793-presentation-de-lundaf-2017-2021>.

²⁶⁰ www.ebrd.com/work-with-us/project-finance/project-summary-documents.html?1=1&filterCountry=Morocco.

Policy framework

The 2011 Constitution requires that Morocco's development policies are consistent with sustainable development. The 2014 Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development requires that development policies consider sustainable development and unify the strategic vision of all actors involved.

Institutional framework

The Ministry of Energy Transition and Sustainable Development is responsible for representing the Government in bilateral and multilateral negotiations in the fields of its competences, among other matters. The Department of Sustainable Development is the leading authority for the majority of MEAs. The website of the Department contains useful information to inform the public on its activities, for instance, on legislation adopted and strategies and plans under implementation. The website also contains information on the fight against accidental marine pollution,²⁶¹ which provides access to a description of the testing of the National Contingency Plan. However, the pages related to MEAs and other multilateral governmental agreements ratified²⁶² only contain the laws with which Morocco ratified or acceded to the instrument.

For conventions and protocols related to sea fisheries, the competent authority is the Department of Marine Fisheries within the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests. The Department is responsible for elaborating and implementing governmental policies in the sector and coordinating the different activities. The National Fisheries Office, INRH, National Ports Agency, Royal Navy and Royal Maritime Police also play different roles in the implementation of conventions or agreements.

Other institutions involved in the implementation of MEAs and bilateral agreements are the:

- Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests;
- Ministry of Equipment and Water;
- INRH;
- Standing Committee on Air Quality Monitoring and Surveillance.

The Competence Centre for Climate Change (4C-Morocco) was established in 2016 by the Joint Order No. 3174-16 of the then Minister of Energy, Mines, Water and the Environment in charge of environment and the Minister of Economy and Finances approving the agreement establishing a public interest group called Competence Centre for Climate Change. The objective of the Centre is to contribute to reinforcing capacities of national stakeholders on climate change; capitalizing information, knowledge and know-how on vulnerability to climate change and also adaptation to climate change and the mitigation of its effects; developing support to decision-making on climate change; and contributing to world efforts by sharing experience, especially in African countries and the Middle East.

The HCP is responsible for collecting, analysing and publishing statistical data. Other decentralized bodies collecting statistical data related to their competences also provide data, together with the statistical offices of larger ministries. The HCP coordinated the work of the country's VNR in 2020. In 2019, the then Ministry of Foreign Affairs, the then Ministry for African Cooperation and for Moroccan Expatriates, and the HCP, organized, with the cooperation of the United Nations Country Office in Morocco, a national consultation to assess the status of implementation of the SDGs and prepare the country's participation in the High-level Political Forum of 2020.

However, the HCP faces some issues. According to an analysis of the Court of Audit in 2018, not all statistical offices frequently produce data collected with non-harmonized methodologies, and data at the regional level are not available. As part of the monitoring of the implementation of the SDGs, the HCP has carried out a set of actions including, in particular, broadening of the scope of the production of statistical information through the reform of statistical surveys, improving collection methods and data processing, through carrying out new surveys.

In 2019, the HCP signed a partnership agreement for 2019–2021, according to which UNDP and 10 other United Nations agencies would support Morocco on statistics and indicators for the implementation of the SDGs.

Morocco is also a member of several regional fisheries management organizations, including the General Fisheries Commission for the Mediterranean (GFCM) and the International Commission for the

²⁶¹ www.environnement.gov.ma/fr/component/content/article/116-theme/zones-cotieres/3499-lutte-contre-la-pollution-marine-accidentelle.

²⁶² www.environnement.gov.ma/fr/lois-et-reglementations/conventions-et-accords.

Conservation of Atlantic Tunas (ICCAT).²⁶³ Morocco is also a member of the WestMed initiative for the development of the Mediterranean Sea.

7.5 Assessment, conclusions and recommendations

Assessment

Since 2012, the country has adopted important strategies, programmes and framework legislation aligning its legal and policy framework with the international agreements ratified, and the 2030 Agenda on Sustainable Development, along with its efforts towards greening the economy.

The past years have shown Morocco's ambition to strengthen its participation in, and implementation of, MEAs. The country is party to a great many MEAs, including prominent ones such as the CBD, CITES, Ramsar Convention and UNFCCC. Since 2012, the country has ratified protocols and conventions related to framework conventions to which it was already party, such as IMO conventions and the Barcelona Convention.

Since the last EPR, several actions have been undertaken to meet the obligations of these agreements. The country's updated NDC reveals more ambitious targets by 2030, with a 45.5 per cent decrease in GHG emissions compared with the BAU scenario. It has progressively reduced the release of HCFCs, by 41.05 per cent since 2010. Actions have also been promoted regarding biodiversity under the NBSAP. More than 75 per cent of the actions have been assessed as being partially or completely effective. The country has also developed legislation, programmes and strategies to reinforce its commitments towards the protection of endangered species and conservation of migratory species, to combat desertification and to address the transboundary movement of hazardous waste. New Ramsar sites have also been recorded. In 2015, Morocco requested the withdrawal of its exemption regarding the use of DDT under the Stockholm Convention.

Other actions have also illustrated the country's willingness to expand its participation in international collaboration regarding environmental matters. In 2016, Morocco hosted the UNFCCC COP22. The country maintains important cooperation with several countries, the European Union and financial actors. These partnerships provide assistance to the country

through programmes and projects aimed at increasing sustainable development, in the areas of climate change, species conservation and water, among others. Moreover, the country is particularly committed to the development of South-South initiatives, especially with African countries, through the creation of different agreements.

Capacity-building activities, aimed at strengthening the capacities of the different actors involved within the framework of the various conventions, have been organized in areas such as biodiversity, the protection of endangered species and of migratory species, and pesticide management. These campaigns targeted not only the administrations in charge but also NGOs and local communities, some including a focus on vulnerable groups such as women and girls.

The country must make some progress in different areas to improve its international participation. Regarding accession to conventions and protocols, it has ratified the Nagoya Protocol but not the Kigali Amendment to the Montreal Protocol. While it ratified the Cartagena Protocol, no legislation regarding LMOs exists. Some reporting is not updated. Reports have also pointed out the lack of data, which hinders the possibility of assessing and keeping track of the measures of the different programmes put in place to adhere to Morocco's commitments under these conventions.

Data collection and official reporting of SDG implementation is assigned to the HCP. According to the HCP, the national statistical system was able to produce up to 48 per cent of the indicators related to the SDGs.

In the SNDD 2020 newsletter,²⁶⁴ Morocco listed fighting against the effects of climate change and preserving marine and terrestrial biological diversity among the SDGs that could not be reached by 2030, despite the fact that the country implemented several measures to respond to crises, such as the National Water Strategy. Nonetheless, it still lacks a national strategy for integrated risk management. Such a strategy could increase environmental, economic and social resilience to major risks and unify risk management in the country.

Participation of NGOs in meetings of governing bodies of the conventions is usually at the invitation of the MEA secretariat and rarely at the invitation of the country – although there were exceptions, for instance

²⁶³ www.iccat.int/en/.

²⁶⁴ www.environnement.gov.ma/images/SNDD/fr/NewsLetter-SNDD-FR-HD-min.pdf.

the invitation of journalists during COP22 and at subsequent events.

The implementation of the recommendations on international cooperation of the first EPR is mixed. While Recommendation 5.2 to consider acceding to the Aarhus Convention has not been implemented, Recommendations 5.1 and 5.3 are being implemented. However, the country developed legislation regulating public participation. Furthermore, the policy on decentralization is also seen as a means for more public participation at the regional and local levels.

Morocco made progress in the implementation of national DRR strategies in line with the Sendai Framework, its score on adoption increasing by 16.7 per cent from 2016 to 2019 (SDG indicators 1.5.3, 11.b.1, and 13.1.2). In 2015, 9.6 per cent of the country's land was estimated to be degraded (SDG indicator 15.3.1) but the trend cannot be assessed due to the lack of data.

Conclusions and recommendations

Legal framework on biosafety

Morocco has been a party to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity since 2011. However, no legislation regarding the introduction, use and marketing of LMOs is in place in Morocco.

Recommendation 7.1:

The Government should adopt a legal framework on biosafety and develop a programme for the control and eradication of invasive alien species, and establish a system for assessing and managing the risks associated with the use of LMOs.

Missing agreements

Although the country has ratified major MEAs and is party to more than 100, acceding to some agreements or to amendments to major environmental agreements would support the country to implement them. Accessing the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters provides a support to effective engagement of the public. It is also the only international agreement that has systematized the international recognition of the principles of public participation and access to information and justice in environmental matters as fundamental rights. By ratifying the Convention, the country would have access to support and training

possibilities to integrate such principles into national legislation.

Recommendation 7.2:

The Government should accelerate the process of ratification of or accession to the:

- (a) *Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety;*
- (b) *Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters and its Protocol on Pollutant Release and Transfer Registers.*

Reporting activity

Recommendation 5.1 of the first EPR recommended improving the country's reporting activity under MEAs. Despite major improvements, some reports are still missing, such as those regarding the Convention on the Conservation of European Wildlife and Natural Habitats, which many countries provided for the period 2017–2018, and the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, for which reports for the years 2018 and 2019 are missing.

Recommendation 7.3:

The Government should ensure that relevant authorities responsible for various multilateral environmental agreements continue their efforts on the reporting activity, as required under these agreements, to guarantee the country's commitment to the agreements.

Coastal areas protection and management

Protecting coastal areas is important for Morocco. Its coasts host 51 per cent of the population, 80 per cent of industry and 50 per cent of tourist infrastructure. Morocco has not fully made use of instruments provided by international agreements it has ratified to protect its MPAs and create new ones. For instance, at the time of writing, none of the areas in Morocco has been submitted to the IMO (for designation as Marine Particularly Sensitive Sea Areas) or for the UNESCO Convention on World Heritage. By taking such actions, the country would find support in protecting ecosystems (for instance the high seas) that, under the current legislation, are under-protected or not protected at all.

Recommendation 7.4:

The Government should:

- (a) *Continues harmonization of national legislation on integrated coastal zone management with the Barcelona Convention and its Protocols;*
- (b) *Submits protected areas in coastal regions for listing at the International Maritime Organization (as Marine Particularly Sensitive Sea Areas) or for the UNESCO Convention on World Heritage, to benefit from support to complete coastal management and protection.*

Integrated risk management

Morocco implemented several measures to respond to environmental crises and risks. It has a National Contingency Plan, tested every two years, and is participating in projects and activities to reinforce its DRR strategy. Nonetheless, it still lacks a national strategy for integrated risk management. Such a strategy could increase environmental, economic and social resilience to major risks and unify risk management in the country.

Recommendation 7.5:

The Government should:

- (a) *Operationalize the National Strategy of Natural Disaster Risk Management and implement it;*
- (b) *Prepare a national disaster risk reduction strategy or plan.*

Sharing information on the implementation of multilateral environmental agreements

The website of the Department of Sustainable Development contains useful information to help the public be informed on its activities. However, pages dedicated to MEAs and other multilateral agreements ratified list the laws by which Morocco ratified or acceded to the instrument. The public lacks information on the actions carried out by the ministry.

Recommendation 7.6:

The Department of Sustainable Development should:

- (a) *Upload on its website the implementation reports of the multilateral environmental agreements that it submits to the secretariat of such agreements;*
- (b) *Enhance the sharing of other related information, for instance, on participation in programmes or projects.*

PART II
ENVIRONMENTAL MEDIA AND POLLUTION
MANAGEMENT

Chapter 8

AIR PROTECTION

8.1 Air quality

Addressing the degradation of air quality is a top priority of Morocco's national policy for the protection of the environment and the health of its population.

Over the past 20 years, Morocco has undergone rapid urbanization and growth of industrial production, which have negatively impacted air quality. Road transport and industrial and energy installations are the main sources of pollutant air emissions of anthropogenic origin.

Urban air quality has been monitored using networks of 36 ground monitoring stations, including two mobile units. Further, models are used to assess emissions and predict changes in air quality at discrete points. The air pollutants measured at all stations are mainly nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), ozone (O₃), and particulate matter (PM₁₀). Due to the lack of measurement data for these pollutants, it is difficult to measure their annual concentrations and assess their trends on a countrywide scale over a 10-year period. This is mainly because the number of monthly measurement data is limited, and therefore it is difficult to interpret the historical data in order to produce an assessment of the air quality.

However, in 2019 by the Department of Sustainable Development had commissioned a study to assess the state of air quality in cities with measuring stations. This study considered the available results of measuring stations only for the year 2016 and the results of studies on emission cadastres carried out by the Department at the level of the cities and provinces. The study was done by comparing the measured values of air pollutants during 2016 with the limit values set by the Moroccan standard, the information thresholds and alert threshold, and the calculated air quality index. The air quality in some cities has significant exceedances of limit values, while others have fewer exceedances. Therefore, the annual average and percentile calculated for all stations in the national network showed that SO₂ and PM₁₀ were above the limit values set by the European Union and local standards. It is noted that the measuring stations installed in some cities were not operational in 2016. One of the main focuses of the study was to assess the

state of air quality in Casablanca, which tops the list of the most polluted cities in the country. It is the city most exposed to two major sources of pollution: industrial and traffic-related pollution, which generally affects human health, depletes biodiversity and disrupts the overall functioning of ecosystems.

All stations in Casablanca showed exceedances of the SO₂ limit value (20 µg/m³), which is mainly due to industrial activities. Regarding human health, only one exceedance of the 99.2 percentile of daily averages in relation to the limit value (125 µg/m³) was recorded, at the CAS-Zerktoni station. All stations in Casablanca exceeded the PM₁₀ limit value (50 µg/m³), essentially due to road traffic. The maximum average concentrations are recorded at the stations of CAS-Ain Harrouda, CAS-Bouskoura, and CAS-Zerktoni. These figures are well above the PM₁₀ limit value, such that checking the validity of the data may be required. The 90.4 percentile of daily average PM₁₀ shows that the limit value for health protection was exceeded at all stations de Casablanca.

According to the WHO Global Health Observatory, in 2016, the estimated age-standardized mortality rate attributed to ambient air pollution was 45 deaths per 100,000 population; the age-standardized mortality rate attributed to household air pollution was five deaths per 100,000 population. The estimated age-standardized mortality rate attributed to households and ambient air pollution together was 28 deaths per 100,000 population in 2019 (SDG indicator 3.9.1). It is not possible to assess the trends due to the lack of data. According to WHO, the annual mean levels of fine PM (population weighted) (SDG indicator 11.6.2) increased from 24.02 µg/m³ in 2011 to 28.4 µg/m³ in 2016 (an increase of 18.2 per cent). This increase affected urban areas (18.8 per cent) more than rural areas (17.6 per cent).

8.2 Trends in emission levels

Morocco has fulfilled its obligations under the UNFCCC by submitting three national communications on climate change and two biannual reports. These reports provide information on GHG inventories for the period 2010, 2012 and 2014. Additionally, a fourth national communication on climate change containing data for 2018 is being prepared.

Trends in emission levels cannot be easily determined because there is a lack of information and data over the past 10 years for a number of parameters. These shortcomings are noted despite the production of air emissions cadastres for several cities. There is also a lack of consultation among the various actors involved. In response to this, collaborative production of records of atmospheric emissions is one of the main planned measures to be implemented under the PNSQA. This would help communication and regular updated inventories.

Table 8.1 presents a summary of GHG emissions by sector of activity since 2004. The average annual growth rate was 3.5 per cent for the period 2004–2018. These emissions were estimated in accordance with the 2006 guidelines of the Intergovernmental Panel on Climate Change (IPCC), covering the main GHGs. These depend on the data available. Methane (CH₄) and nitrogen dioxide (NO₂) were mainly generated by agriculture. The energy sector was responsible for 67.3 per cent of GHG emissions and agriculture 22.8 per cent (table 8.2).

8.3 Performance and gaps in air monitoring networks

Currently, the national air quality monitoring network consists of 36 stationary stations located in 15 cities. In 2020, the management of this network has been delegated to LNEP within the framework of the memorandum of understanding between the Department of Sustainable Development, Mohammed IV Foundation for Environmental Protection, the General Directorate for Local Authorities of the Ministry of the Interior and the DGM. In the same year, these major players also signed two specific agreements outlining the obligations of the different parties to the deployment of the network: a specific agreement related to the transfer of management of the national air quality monitoring network from the DGM to the Department of Sustainable Development; and a specific agreement relating to the management of the national air quality monitoring network.

Photo 8.1: Data acquisition station, Casablanca



Photo credit: Bouchra Taouil

Table 8.1: GHG emissions by sector of activity, 2004–2018, Gg CO₂-eq.

	2004	2006	2008	2010	2012	2014	2016	2018	Average annual growth rate		
									2004–2010	2010–2018	2004–2018
									%	%	%
Energy	37 839.8	41 766.2	45 070.3	47 726.2	53 549.2	54 926.9	56 720.6	61 206.6	3.9	3.2	3.5
CO ₂	36 387.8	40 385.2	43 753.7	46 458.5	52 245.2	53 593.4	55 354.6	59 788.8	4.2	3.2	3.6
CH ₄	955.7	868.1	789.5	694.1	688.3	682.3	666.4	665.7	-5.2	-0.5	-2.5
N ₂ O	496.3	513.0	527.1	573.6	615.8	651.2	699.7	752.0	2.4	3.4	3.0
IPPU	4 179.9	4 593.3	5 879.5	6 024.6	6 524.4	5 871.0	5 906.5	5 667.6	6.3	-0.8	2.2
CO ₂	4 170.8	4 584.2	5 870.3	6 015.4	6 503.0	5 833.4	5 843.4	5 561.9	6.3	-1.0	2.1
CH ₄	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
N ₂ O	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
HFCs	9.1	9.1	9.1	9.1	21.4	37.6	63.1	105.7	0.0	35.8	19.1
Agriculture	15 572.9	15 404.9	16 032.9	17 487.8	18 175.5	19 112.2	19 214.2	20 729.3	2.0	2.1	2.1
CO ₂	48.6	34.9	30.3	28.2	24.1	34.0	34.0	34.0	-8.7	2.4	-2.5
CH ₄	6 888.6	6 878.5	6 939.8	7 518.8	8 040.1	8 117.7	8 519.3	8 787.5	1.5	2.0	1.8
N ₂ O	8 635.7	8 491.5	9 062.8	9 940.8	10 111.4	10 960.5	10 660.9	11 907.8	2.4	2.3	2.3
LULUCF	-2 274.7	-2 164.9	-2 315.5	-2 270.6	-2 095.7	-1 955.5	-1 585.8	-1 745.6	0.0	-3.2	-1.9
CO ₂	-2 306.5	-2 189.0	-2 320.8	-2 278.6	-2 116.3	-1 961.8	-1 596.0	-1 748.8	-0.2	-3.3	-2.0
CH ₄	19.2	14.5	3.2	4.83	12.40	3.81	6.18	1.92	-20.5	-10.9	-15.2
N ₂ O	12.63	9.58	2.09	3.19	8.17	2.51	4.08	1.27	-20.5	-10.9	-15.2
Waste	3 379.6	3 541.4	3 719.4	4 011.1	4 215.1	4 426.4	4 846.2	5 086.6	2.9	3.0	3.0
CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
CH ₄	3 045.9	3 190.3	3 350.6	3 624.1	3 806.7	3 997.9	4 399.0	4 639.4	2.9	3.1	3.1
N ₂ O	333.8	351.0	368.8	386.9	408.4	428.4	447.2	447.2	2.5	1.8	2.1
Total	58 697.6	63 140.9	68 386.5	72 979.0	80 368.5	82 381.0	85 101.7	90 944.5	3.7	2.8	3.2
CO ₂	38 300.7	42 815.2	47 333.6	50 223.5	56 655.9	57 499.0	59 636.0	63 636.0	4.6	3.0	3.7
CH ₄	10 909.3	10 951.4	11 083.0	11 841.9	12 547.5	12 801.8	13 590.8	14 094.5	1.4	2.2	1.8
N ₂ O	9 478.4	9 365.1	9 960.8	10 904.5	11 143.7	12 042.6	11 811.8	13 108.2	2.4	2.3	2.3

Source: National GHG Inventory, 2018.

Note: IPPU = Industrial Processes and Product Use; LULUCF = land Use, Land-use Change, and Forestry.

Table 8.2: Distribution of GHGs by sector, 2018, percentage

	Energy	IPPU	Agriculture	LULUCF	Waste
	67.30	6.20	22.08	-1.90	5.90

Source: National GHG Inventory, 2018.

Note: IPPU = Industrial Processes and Product Use; LULUCF = land use, land-use change, and forestry.

In terms of monitoring, the LNESP carries out several activities aimed at characterizing and evaluating air pollution at the national level. The LNESP and the Air Pollution Prevention Service (SPPA) under the Department of Programmes and Achievements (DPR), notably coordinated the development of the PNSQA. Through this program, they contribute to the application of the laws and regulations in force, to the development of atmospheric emission standards and the establishment of limit values, as well as to the coordination of the network of laboratories at the national scale. The LNESP and the SPPA work in coordination with the priority regions in order to centralize and validate the data, to detect hidden trends and to intensify actions. This meets the requirement of Recommendation 6.1 of the first EPR, which urged the then Ministry of Energy, Mines, Water and Environment to finalize the national programme on air protection covering all sectors with air pollution impacts by identifying priorities, designing prevention and abatement measures with time frames, and estimating the related budget.

The PNSQA is part of the continuity of the PNAir. In order to raise the number of stations from 36 to 140 by 2030, a fund has been dedicated to the acquisition of new stations necessary for the measurement of air quality. Of these, it is expected that 54 stations will be acquired before the end of 2022, along with new equipment for the maintenance of measuring instruments, data transmission and data analysis. Computer equipment for data processing is also expected to be purchased. By acquiring this equipment, the LNESP will allow the Department of Sustainable Development to start strengthening the monitoring network at the regional level by: (1) updating the status of air pollution, distribution and origins of air pollutants; (2) updating studies of the cadastral emissions registry at the regional level according to the new administrative structure; and (3) centralizing the database in the LNESP.

Currently, the PNSQA is in a transition phase coordinated by the Mohammed VI Foundation for the Protection of the Environment. During this transition phase, the LNESP will be receiving stations operated by the DGM. The LNESP will also accompany the regions in establishing regional networks. This process is expected to be finalized by the end of 2023.

However, the current number of stations does not allow for the undertaking of a comprehensive survey of the air quality situation in the country and other areas of pollution monitoring. Moreover, the geographical distribution of air quality sampling points was revised in the framework of PNSQA while relying on sampling for the choice of locations. The system uses models to assess emissions and predict changes in the air quality at discrete points.

8.4 Pressures on air quality

Energy

The energy sector is the major source of GHG and air pollutant emissions. Its share of these emissions varied between 66 per cent in 2014 and 67.3 per cent in 2018. The energy subsectors covering emissions from fuel combustion have contributed the most to these increases.

According to the IEA, as at 2017, Morocco relied almost 90 per cent on fossil fuels. Petroleum products are the main source of fuel, accounting for 62 per cent of energy production. However, the country has strengthened its wind (1,220 MW in 2019) and solar (711 MW in 2019) capacities with the goal of increasing the share of renewable energy in electricity production to 52 per cent by 2030.

Industry and mining

The industrial sector accounts for nearly 30 per cent of GDP and 21 per cent of employment.²⁶⁵ This is due to the growth of industrial production in Morocco over the past 20 years. However, this has been accompanied by an increase in atmospheric emissions, which are partially treated. The main sources of industrial emissions are chemical plants, the textile, food and agrifood industries, and metallurgy plants. Some of these plants do not monitor and do not report on their emissions, apart from cement plants and other enterprises, voluntary to perform it. Thanks to automatic analysers installed in chimneys, the cement factories provide data on air emissions and transmit them periodically to the Department of Sustainable Development according to a partnership agreement. These reports are not publicly available or for consultation.

As part of the environmental upgrading of the pottery sector, a funding line was established in 2019 to replace the traditional polluting kilns with modern gas kilns within the FNEDD. Implementation of

²⁶⁵ www.environnement.gov.ma/images/Climat/7.BUR2-min.pdf.

Recommendation 6.3 of the first EPR, which urged the then Ministry of Handicrafts and then Ministry of Energy, Mines, and Environment, with the support of the Mohammed VI Foundation for Environmental Protection and relevant stakeholders, to continue to work out technical solutions and incentives to shift traditional pottery kilns from wood to gas fuel, is ongoing.

Agriculture

The agriculture sector represents the second largest emitter of GHG emissions in Morocco, its share varying between 25 per cent in 2014 and 22.8 per cent in 2018 (fourth national communication on climate change). The main sources of GHG emissions in agriculture in 2014 were agricultural soils (46 per cent of the total emissions of the agricultural sector, in the form of N₂O), enteric fermentation (44.7 per cent), manure (9.1 per cent), application of urea (0.9 per cent, in the form of CO₂) and rice cultivation (0.1 per cent, mainly methane (CH₄)).

Transport

The transportation sector is a major source of air pollutants and GHG emissions, in particular, in densely populated urban areas. However, there are no recent data on national air emissions from the transportation sector.

More than 50 per cent of vehicles are concentrated in the Rabat–Casablanca area. The distribution of road fleets and their activity indicate the areas with the highest GHG emissions. Table 8.3 describes vehicle trends in the period 2015–2020. This distribution highlights the importance of passenger cars, which have increased in number by 16.5 per cent in three years.

Housing

As at July 2021, no information on indoor pollution is available.

Tourism

As at July 2021, no information on air pollution from tourism is available.

8.5 Legal, policy and institutional framework

Legal framework

Over the past decades, Morocco has strengthened the legislative and regulatory framework for air quality. Several legal texts directly and indirectly related to air quality have been promulgated or amended by the Department of Sustainable Development or other authorities. The goal is to strengthen the regulatory framework for better air quality protection.

The 2003 Law No. 13-03 on Combating Air Pollution is applied in coordination with authorities concerned with establishing air quality monitoring networks and detecting pollution sources. Although the Law was not updated, several joint ministerial orders have been issued since 2012 (chapter 1). These joint orders are important in that they strengthen air emissions control and monitoring, while engaging ministries not directly responsible for environmental protection. This partially meets the requirement of Recommendation 6.2 in the first EPR, which urged the then Ministry of Energy, Mines, Water and Environment to elaborate the implementing regulations in the Law on Combating Air Pollution, and its implementing decrees, and finalize decrees on sectoral air emission limit values. This recommendation is partially implemented. However, the relevant enforcement regulations are developing only slowly. The country did not develop data-processing and validation procedures at the air quality monitoring network level and the absence of a set of implementation texts that would allow the implementation of provisions of Law No. 13-03 on Combating Air Pollution by all economic sectors.

Table 8.3: Vehicles, 2015–2020, number

	2015	2016	2017	2018	2019	2020
Motorcycles	43 220	55 517	130 257	191 611	236 415	266 035
Passenger cars	2 531 753	2 670 614	2 808 782	2 950 056	3 090 063	3 194 307
Commercial vehicles	1 015 245	1 065 338	1 117 559	1 170 177	1 225 878	1 271 651
Total	3 590 218	3 791 469	4 056 598	4 311 844	4 552 356	4 731 993

Source: Ministry of Equipment, Transport, Logistics and Water, Statistical Yearbooks.

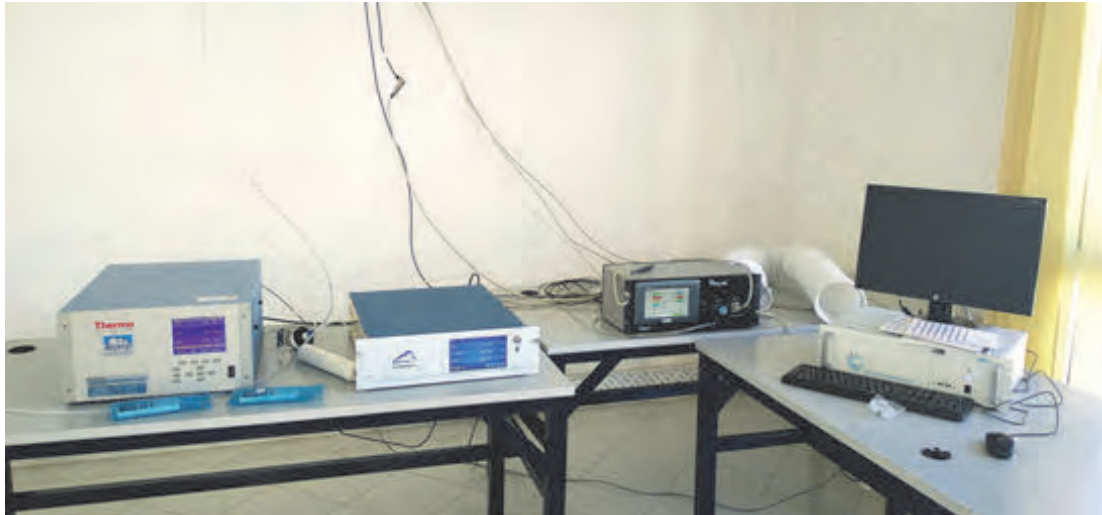
Photo 8.2: Air quality modelling platform

Photo credit: Bouchra Taouil

The 2009 Decree No. 2-09-286 defining air quality norms and air monitoring methods sets air quality standards and defines ways to establish air quality monitoring networks. The most important air pollution parameters, such as PM_{2.5} and emissions from fuel for energy production, are included in the air quality monitoring system in one amendment to the 2009 Decree. In applying the provisions of Decree No. 2-09-286, the air quality index is determined by measuring the concentration levels in the air of the four atmospheric pollutants, namely, SO₂, NO₂, O₃ and PM₁₀. The conditions and methods for calculating the air quality index are also specified in Decree No. 2-09-286 by joint order of the Ministry of Health and Social Welfare and the Department of Sustainable Development. This is based on data from air quality monitoring stations. The overall air quality of an urban area is marked on a scale of 1 to 10 for an integer value associated with the air quality index. Information thresholds for the listed pollutants are set at 350 µg/m³, 250 µg/m³, 200 µg/m³ and 150 µg/m³, respectively. When the level of concentration of these pollutants reaches the information threshold, the Standing Committee on Air Quality Monitoring and Surveillance takes all possible measures to inform the public. In addition, alert thresholds for the listed pollutants are set at 550 µg/m³, 400 µg/m³, 260 µg/m³ and 200 µg/m³, respectively. When the concentration level of a pollutant exceeds the alert thresholds for three consecutive hours, the necessary emergency measures are taken to reduce the effects of the peak pollution on the population. Furthermore, it is required to activate the information threshold, alert threshold and air quality index at the regional level.

The 2019 Decree No. 2-18-74 on the National GHG Inventory System allows the collection and processing of data on the activities of sectors emitting GHGs and

any other data required for the preparation of the national inventory report, in accordance with international standards. However, the Decree does not specify how the sectors concerned should reduce their emissions. Decree No. 2-09-631 sets limit values for the release, emission or discharge of pollutants into the air from stationary sources and the procedures for their control. Implementation decisions have already been made to determine the limit values of activities in the ceramics sector, cement production facilities, and cement production facilities that jointly burn waste (co-incineration).

Joint Ministerial Order No. 1504-18 fixing sectoral limit values for the release, emission or discharge of pollutants into the air from cement production facilities and cement production facilities practising waste co-incineration, stated that the measurements carried out to check compliance with the limit values are made to the standardized conditions of temperature (273 Kelvins), pressure (1,013 hectopascals) and the rate of oxygen (10 per cent). This is after deducting the value of water for the chimneys of the ovens. The same measurements are carried out for the release of pollutants into the air from activities in the ceramics sector under the terms of Joint Ministerial Order No. 2323-20.

Policy framework

According to a study led by the World Bank in 2014, the cost of air quality degradation was estimated at 9.7 billion dirhams, which is equivalent to 1.05 per cent of GDP. In response to this, in 2017, Morocco adopted the PNAir. Its main objectives are the strengthening and extension of the national air quality monitoring network, reduction of emissions in the transport and industrial sectors, improvement of the regulatory

framework in terms of air pollution by the transport and industrial sectors, and the raising of awareness and communication on air pollution. Recommendation 6.1 of the first EPR, which urged the country to finalize the national programme on air protection, has thus been implemented.

Actions and measures aimed at reinforcing the national air quality monitoring network have already been undertaken. For example, protocols and conventions have been signed by the various ministries involved in the programme. The national and regional reports on air quality have been developed for 2019. Ten standing committees on air quality monitoring and surveillance have been established to fulfil the requirement of Decree No. 2-09-286. Cadastres of atmospheric emissions for the biggest cities, including Casablanca, Mohammedia, Rabat, Salé and Témara, among others, have been produced. The legal framework has also been updated and new provisions have been enacted.

The latest initiative concerns the development of the PNSQA in the framework of the PNAir. This programme is expected to support the measures already undertaken and strengthen the involvement of stakeholders to reduce the amount of air pollution at the regional and national levels. It consists of establishing a governance system for air quality management in collaboration with the regions, through three specific conventions for the regions of Marrakesh-Safi, Sous-Massa and Fès-Meknès. Others are being developed and signed, namely for Casablanca-Settat, Rabat-Salé-Kenitra, Oriental, Beni Mellal-Kenifra and Tangier-Tétouan-Al Hoceima. This allows for the preparation of the national report and annual regional reports on air quality, which activate the mechanisms for implementing emergency measures related to air quality monitoring.

The PCN has been followed by several regional plans to date; the remaining regional plans are expected to be produced in 2021–2022 with the support of the World Bank (chapter 1).

In addition to current strategies and programmes, the SNDD, which was developed to accelerate the transition to a inclusive green economy by 2030 and change production and consumption patterns towards practices that have less of an impact on the environment. Among its objectives is the reduction of air pollutant emissions.

To achieve a successful transition, Morocco has made a proactive commitment to implement adaptation and mitigation actions on climate change. This commitment is in harmony with Morocco's efforts to

consolidate climate governance, develop structural adaptation and mitigation projects, mobilize financing and strengthen knowledge and monitoring. The PCN is the foundation of this coordination and the framework for developing a medium- and long-term climate policy, which would address the challenges of climate change in the Moroccan context.

In presenting its first NDC on 19 September 2016, Morocco set an ambitious target of a 42 per cent reduction in GHG emissions by 2030, with 25 per cent depending on international support, in addition to a number of adaptation targets for the most vulnerable sectors, such as agriculture, water, forests and fisheries. Morocco's updated NDC (2021), which is anchored in the SNDD, consists of 65 mitigation actions, of which 36 are unconditional actions based on the mobilization of Morocco's own resources. This includes, in particular, the flagship measures of the solar and wind plans and 29 conditional actions taking into account international support needs. Morocco is now raising its ambition by committing to an unconditional 18.3 per cent reduction in emissions by 2030. With financial support, Morocco has stated that it could achieve an additional 27.2 per cent reduction by 2030, bringing the total target to a 45.5 per cent reduction in GHG emissions by 2030.

In addition, Morocco's vision for adaptation is divided into several sectoral goals for the horizon 2030–2050. Although Morocco is already investing heavily in adaptation, achieving these goals will only be possible with significant support from the international community and donors. The main objectives of the meteorological sector include strengthening the network of meteorological observation stations through the acquisition of new stations and establishing a national meteorological network. The measures will integrate other partner stations to reach a single network of 1,000 stations. Alert mechanisms and tools have also been implemented to enhance air quality monitoring procedures and their implications for health.

With regard to its commitments under the UNFCCC, Morocco has complied with the monitoring, reporting and verification requirements by producing national communications and biennial update reports. These reports provide information on GHG inventories, mitigation measures, needs and support received. In drafting these reports, Morocco recognized the need to further enhance its transparency framework through the establishment of the National GHG Inventory System. Morocco has also taken steps to incorporate short-lived climate pollutants (SLCPs) into its policy to combat air pollution and climate change. By joining the Climate and Clean Air Coalition's Supporting

National Action and Planning (SNAP) initiative, Morocco has developed an action plan that will focus on the inventory of short-lived climate pollutants such as methane, tropospheric ozone, HFCs and black carbon. Its implementation will be monitored, and results incorporated into future national reports.

Institutional framework

Ministry of Energy Transition and Sustainable Development

The Department of Sustainable Development of the Ministry of Energy Transition and Sustainable Development is responsible for monitoring, developing and implementing the Government's environmental policy. To this end, its mission in relation to air quality is to take all necessary measures to manage and implement air quality monitoring networks. This is done at the national and regional levels, in consultation with relevant organizations.

The Department ensures the progressive management of the national air quality monitoring network, in accordance with the practical arrangements set out in the agreement signed between it and the DGM. In addition, it contributes to the financing directed to strengthening the air quality monitoring network in order to create the necessary structures for monitoring air conditions and the acquisition of new equipment to measure air quality and ensure maintenance operations directly or through local authorities.

In addition, the Department drafts laws and regulations related to the protection of air quality and monitoring and their implementation in accordance with the applicable legislation. In its mission of protection and monitoring of air quality, the Department has the LNSEP, which participates in particular in the installation of measurement and monitoring networks and air quality and in the analysis of the results of air quality monitoring.

Ministry of the Interior

The General Directorate for Local Authorities of the Ministry of the Interior coordinates the programmes developed to strengthen the air quality monitoring network at the territorial level with the prefectures, regions, and municipalities. It represents the local authorities in relation to the ministerial departments concerned to coordinate their activities. This is in accordance with the policies on air quality protection. In addition, it organizes meetings and training on air quality, as well as field visits, both in Morocco and

abroad. Further, the Directorate contributes to the financing of the air quality monitoring network, in particular through the renewal and acquisition of new stations, by ensuring the connection of the stations to the electricity network and the safety of the stations.

Ministry of Transport and Logistics

In order to contribute to the reduction of atmospheric emissions generated by the transport sector, the Ministry of Transport and Logistics is responsible for the monitoring and control of technical control centres. This is undertaken in order to verify the compliance of vehicles with the applicable regulatory terms, as well as to ensure that they are suitable for use on public roads.

The National Centre for Testing and Certification has among its missions the R&D of prototype environmentally friendly vehicles and ensuring compliance with environmental standards.²⁶⁶

There is no up-to-date database of pollutant emissions from vehicles, nor emission inventories and registers. Regulations on air pollution generated by the transport sector are not in force, in particular for the control of motorcycles.

Ministry of Health and Social Welfare

The Ministry of Health and Social Welfare studies and conducts research on the epidemiology of air-pollution-related diseases. It is committed to epidemiological surveillance and contributes to the definition of air quality standards. In 2019, it conducted a study to advocate the updating of Decree No. 2-09-286 setting air quality standards and its implementing regulations to introduce the parameter PM_{2.5}.

General Directorate of Meteorology

The DGM is responsible for the activities related to meteorological and climatological information at the national level and ensures the international exchange of data under the agreements ratified by Morocco. Within the framework of its research activities, the Directorate develops models for weather forecasts and warnings.

In terms of air quality, it takes all necessary steps to gradually transfer the management of the air quality monitoring network to the Department of Sustainable Development. In this regard, it contributes to the choices of air quality measurement equipment, as well

²⁶⁶ www.equipement.gov.ma/AR/Pages/Accueil.aspx.

as interconnections with the DGM's central server housing the national air quality database.

In 2021, the DGM acquired a new supercomputer, AMTAR, that will improve weather forecasting.²⁶⁷ This supercomputer will also make it possible to develop scenarios of climate change expected in Morocco through high-resolution climate models, in addition to providing more accurate information on their impacts on the various economic and social sectors. This supercomputer has been fully operational since 26 July 2021.

Global Green Growth Institute

The Global Green Growth Institute supports Morocco's commitment to transitioning to a green economy. It supports the Ministry of Energy Transition and Sustainable Development in the implementation of the NDC and the SDGs. Aiming to promote an integrated and sustainable green development model at the subnational level, in line with the advanced regionalization process adopted by Morocco, its technical support focuses on developing policies and incentives, identifying and designing bankable projects and assisting in mobilizing financing for their implementation.

Mohammed VI Foundation for the Protection of the Environment

The mission of the Foundation is to promote environmental protection through an approach that focuses on education, awareness, mobilization and capacity-building of stakeholders and partners. Its role in air quality is to support the strengthening of the national air quality monitoring network. This involves mobilizing expertise and funds, building capacity and raising awareness among local actors and citizens about the health and environmental impact of air pollution. It also transfers the stations to the manager of the network under its own responsibility. The Qualit'Air programme launched by the Foundation in 2002 also contributed to the development of measures and actions to enhance air protection. An eco-epidemiological study on the impact of air pollution on health was initiated for greater Casablanca (actually Casablanca-Settat) (chapter 13). Three pilot regions, around Agadir, Marrakesh and Rabat, were selected to implement the programme. In this context, the pilot project in Marrakesh has resulted in a carbon assessment and the introduction of a system to replace gasoline-powered motorcycles with electric ones (two- and three-wheelers).

Atmosphere Competence Centre

Franco-Moroccan cooperation underpins an ambitious programme, "Atmosphere Competence Centre (PCMA)", resulting from collaboration between the National School of Mines of Rabat and the Institute des Mines Télécom Lille Douai.²⁶⁸ The PCMA's mission is to provide a focal point in Morocco on the theme of atmospheric sciences and professions. It thus aims to become the technical and scientific reference centre on air quality in Morocco, and also in North and Sub-Saharan Africa.

The PCMA is equipped with an air quality measurement platform that includes particle analysers for particulate matter (PM1, PM2.5, PM4, PM10), NOX and ozone, as well as a data acquisition station, in addition to an air quality modelling platform. The potential users of these services will be R&D entities in the public sector (ministries, public institutions, regions, municipalities), private sector (professional associations, consulting firms) and industrial sector (CGEM, OCP, Cement Industry Association (APC), thermal power plants).

The PCMA provided data for a study conducted by the Department of Sustainable Development, in collaboration with UNDP, the DGM, and the Mohammed VI Foundation for Environmental Protection, to assess the impact of population containment during the COVID-19 pandemic on air quality and GHGs in Morocco in 2020. The collection of air quality data was carried out in a collaborative manner and mainly involved DGM data from the air quality monitoring network, data from the PCMA station in Rabat, emission inventories from the Department of Sustainable Development, data from the Sentinel 5P satellite and data from CAMS and PCMA modelling.

The results obtained from this study support the relevance of this approach and encourage the efforts of the academic world, including recently the PCMA. Moreover, the study supports the exploitation of satellite observations for air quality and the use of modelling that assesses emissions and predicts changes in air quality.

Financing air protection

Since its inception in 1999, the FODEP has been involved in financing pollution control projects. FODEP has carried out 96 projects, for a total of 605

²⁶⁷ www.maprabat.ma/fr/la-dgm-se-dote-du-supercalculateur-le-plus-puissant-des-centres-meteorologiques-africains/.

²⁶⁸ www.enim.ac.ma/pcma/.

million dirhams, of which FODEP's contribution is 233 million dirhams in the form of grants to:

- 15 projects for the treatment of atmospheric pollution;
- 77 projects for the treatment of liquid waste;
- 4 projects for the treatment of solid waste.

In addition, as part of the environmental upgrading of the pottery sector, a financing line has been set up under the FNEED to finance, up to 40 per cent in the form of a donation, of the replacement of kilns traditional pollutants by modern gas ovens. The first action was carried out in partnership with the APP in two cities and the second action was carried out by the FNEED's own budget to finance gas ovens up to 40 per cent in the form of a donation in three cities.

8.6 Assessment, conclusions and recommendations

Assessment

The lack of data on annual concentrations of air pollutants makes it impossible to adequately assess air quality in Morocco. Evaluations by region, by pollutant and by time unit in parallel with the knowledge of the pollution sources are lacking and hinder a general evaluation. No data on the impact of air pollution on health are available. However, according to the results of the air quality monitoring study conducted in 2019 in Casablanca, the general state of air quality showed that emissions largely exceeded the limit values set by the legislation. POPs and PM_{2.5}, which are among the most harmful pollutants to health, were not included in the study as air quality was assessed using the data available from the existing network. Overall, these shortcomings are mainly due to a lack of equipment for the maintenance of measuring stations and for data processing.

There are currently 36 fixed stations installed in 15 cities, four mobile air quality units and seven stations being refurbished by the Mohammed VI Foundation for the Protection of the Environment. Within the framework of the PNSQA, up to 104 stations should be added, to reach a total of 140 stations by 2030. In 2020, the responsibility for the air quality monitoring network has been transferred to the LNEP. The PNSQA is ambitious and will require good coordination among the key actors involved, which is still difficult at the moment.

Morocco is facing pressures on air quality mainly due to pollution from the energy and transport sectors. The country has updated its NDC with the overall objective of reducing its economy's GHG emissions by 45.5 per

cent by 2030, including an unconditional objective of 18.3 per cent compared to the reference scenario, which corresponds to an emissions evolution in the "business as usual" (BAU). Morocco has already made some progress, for example by initiating a process of replacing polluting traditional kilns with modern gas kilns for the benefit of the pottery sector. This action has started in 2010 with the acquisition of the first gas ovens in Fez and Marrakech. In 2019, other pottery villages also benefited from this action, namely those of Oulja in Salé, Agafay in Marrakech and Tamekroute in Zagoura. Recommendation 6.3 of the first EPR is therefore being implemented.

Major regulations of Law No. 13-03 are issued. However, and despite the general limit values applicable to the industrial sector, sectoral limit values are only set for ceramic and cement production facilities and those for the phosphate, brickworks, steel and sugar industries are in progress of elaboration. Decree No. 2-09-286, which does not set air quality standards and does not define air monitoring methods for PM_{2.5} and emissions from fuels intended for the production of energy is being amended. Recommendation 6.2 of the first EPR has been partially implemented.

In 2017, the country adopted the PNAir, which supported the implementation of Recommendation 6.1 of the first EPR. Some actions have already been conducted, attesting to Morocco's intention to achieve the objectives to improve air protection. Several ministries are involved, helping to reinforce the necessary coordination. In addition, the other governmental programmes and strategies and the programmes of the Mohammed VI Foundation, if adequately implemented and supported, could reinforce air protection.

Regarding the goals of Agenda 2030, the second VNR reports on SDG indicator 3.9.1 and 3.9.2 as well as SDG indicator 11.6.1. The estimated age-standardized mortality rate attributed to households and ambient air pollution together was 28 deaths per 100,000 population in 2019 (SDG indicator 3.9.1). For SDG indicator 11.6.2, the annual mean levels of fine particulate matter were 24.02 µg/m³ in 2011, 26.13 µg/m³ in 2014 and 28.38 µg/m³ in 2016. These figures show an increase, implying that the country is not on track to meet this target.

Conclusions and recommendations

Air monitoring system and management

The air quality is difficult to assess due to the limited availability of data. This problem is due to a limited

air monitoring system. The PNSQA set the objective of 140 stations by 2030.

Recommendation 8.1:

The Department of Sustainable Development, in cooperation with other stakeholders, should:

- (a) *Continue to purchase new measuring stations, maintain or upgrade the existing stations and ensure regular maintenance of equipment, and involve other stakeholders, such as the private sector, in the necessary investment;*
- (b) *Strengthen the governance of air quality;*
- (c) *Increase capacity for air quality management;*
- (d) *Resume the revision of the decree on monitoring and its implementing regulation;*
- (e) *Develop scientific research on air quality monitoring in collaboration with universities and research institutes.*

Air protection and health

Air pollution and health are not analysed together due to the lack of data.

Recommendation 8.2:

The Government should:

- (a) *Improve knowledge of the link between air pollution and respiratory diseases linked to pollution;*
- (b) *Take appropriate action to stimulate the achievement of SDG targets 3.9 and 11.6.*

Fine particulate matter

The transport sector is a huge producer of PM_{2.5} and PM₁₀ emissions and for the past 10 years Morocco's vehicle fleet has been growing rapidly. PM₁₀ emissions exceed the limit values everywhere they are measured, while PM_{2.5} measurements just started. To find the remedies to air pollution, it is important to have a full perspective on the issues.

Recommendation 8.3:

The Department of Sustainable Development should:

- (a) *Install analysers for the measurement of PM_{2.5} and PM₁₀ particles in monitoring stations;*
- (b) *Carry out inventories and cadastres necessary for modelling air quality;*
- (c) *Develop cooperation with some international and national research institutes to gain insight into the opportunities and methodologies of using remote sensing applications to monitor air quality.*

Transport emissions

Both the number of motor vehicles and the number of passenger-kilometres are increasing at a rapid pace, increasing transport air emissions, which can be restricted with technical solutions. The transition to a Euro 6 standard setting the maximum pollutant discharge limits for new vehicles on the road, is scheduled from 1 January 2023 as part of Morocco's updated NDC (in addition to other actions related to the transport sector).

Recommendation 8.4:

The ministry responsible for transport and logistics should:

- (a) *Consolidate audit processes in vehicle technical control centres to strengthen vehicle emissions control;*
- (b) *Revise the regulations for the control of motorcycles in terms of air emissions.*

Recommendation 8.5:

The Government should consider introducing the Euro 6 emissions standard in January 2023.

Climate change

Morocco is currently taking small steps towards taking climate action, and in particular, action to reduce atmospheric pollutants. But the country does not have enough monitoring stations and does not collect data and level of emissions to conduct a comprehensive analysis of the emissions it is producing, and where the national emissions hotspots are. Progress in reducing pollution and emissions is also associated with effective consultation with partners and obtaining the commitment of all stakeholders.

Recommendation 8.6:

The Government should:

- (a) *Operationalize national governance to include climate commitments with a view to monitoring and making progress on climate actions;*
- (b) *Implement national determined contributions to reduce national air and greenhouse gas emissions and adapt to the impacts of climate change;*
- (c) *Encourage universities to conduct scientific and technological research to support the implementation of national strategies related to climate change;*
- (d) *Engage the private sector and civil society in the identification of activities to be taken for climate action.*

Chapter 9

WATER MANAGEMENT

9.1 Water resources

Surface water resources

The seasonal rainfall fluctuations strongly dictate the quantity of water resources, including filling dam reservoirs. The average precipitation recorded over the whole country for the hydrological year 2016–2017 varied from 109 mm to 503 mm, with a cumulative maximum of 1,216 mm at the Jbel Outka pluviometric station in the Sebou basin.

Observations by the General Directorate of Meteorology (DGM) have shown that the cumulative annual national precipitation trends over a set of regions show a downward trend. This is materialized by -16 per cent rainfall during the extended winter (October–March), up to -43 per cent rainfall in the spring season (March–April–May) and up to -26 per cent rainfall in the winter season (December–January–February), resulting in an overall reduction of 16 per cent in the annual cumulative rainfall. This is equivalent to a reduction in the north of Morocco of the number of days with cumulative rainfall exceeding 10 mm.

Surface water resources throughout the territory are estimated at nearly 18 billion m³ in an average year, varying depending on the year from 3 billion m³ to 48 billion m³. The hydrological regime of the river basins is characterized by a significant inter-annual and intraannual fluctuation characterized by the alternation of wet and dry sequences, scattered by years of high hydraulicity or severe droughts. For instance, the yearly surface water resources reached approximately 42 billion m³ in 2009 and 14 billion m³ in 2018, with accentuated oscillations in the recent years (around 8 billion m³ in 2015 and 18 billion m³ in 2017).

The large regional disparity in precipitation also induces a large spatial variability in surface water flows. These vary from the order of millions of cubic metres for the most arid basins, such as the Sakia El Hamra-Oued Dahab (274 million m³/year), Souss-Massa (626 million m³/year) and Ziz-Guir-Rh ris (626 million m³/year), to billions of cubic metres for the most water-rich basins, such as the Loukkos (3.4 billion m³/year) and Sebou (5.6 billion m³/year). The northern basins (Loukkos, Tang rois and Coastal

Mediterranean) and Sebou, which cover nearly 7 per cent of the country's surface area, have more than half of the water resources.

The country has 120 major natural lakes; the majority are located between the two-mountain series of the Middle and High Atlas.

Groundwater resources

Groundwater resources account for about 20 per cent of water resources. The essential aquifers cover a total area of almost 80,000 km², about 10 per cent of the country's area. The quantity of groundwater resources currently available is around 4 billion m³/year, with a minimum of 22 million m³/year recorded in the Sakia El Hamra–Oued Eddahab basin, and a maximum of 1.11 billion m³/year in the Sebou basin.

The groundwater withdrawal is estimated at 3,170 million m³/year, with 40 per cent of the groundwater used for irrigation. According to DGE, the main aquifers in the country show a deficit of around 1 billion m³/year, equivalent to a total volume withdrawn of 5 billion m³.

However, the trend in availability has been declining in recent decades due to the decrease in rainfall and the occurrence of repeated droughts, which have greatly reduced surface water supplies and the recharge capacity of aquifers. An action programme has been set up for prospecting and carrying out studies concerning these aquifers. During the last decade, boreholes (depths of up to 1,400 m) have been carried out with the aim of improving the knowledge of deep aquifers and evaluating their water potential. This programme is expected to be reinforced and accelerated in the years to come.

9.2 Water quality

Table 9.1 provides water quality assessment criteria.

Surface water

Based on the water quality assessment criteria, surface water quality has not changed significantly in recent years (table 9.2). Since 2007, surface waters of "good" and "average" quality have increased while those of "poor" and "very poor" quality have decreased.

However, “excellent” surface water quality has decreased by 5 percentage points, from 6 per cent in 2007–2008 to 1 per cent in 2019–2020.

The surface water quality assessed for the hydraulic year 2016–2017 was good to medium in up to 70 per cent of the monitoring stations sampled. The surface water quality was degraded for the remaining 30 per cent of stations. The greatest number of good quality stations is found in the Souss, Ziz-Guir, Oum Er Rbiâ and Tensift basins; however, the greatest number of poor quality stations is recorded in the Bouregreg and Sebou basins. All the stations where the water quality is degraded are located downstream of the wastewater discharge points.

This degradation of surface water quality is mainly due to a decrease in dissolved oxygen and an increase in organic matter (BOD5, COD), in addition to observed higher concentrations of phosphorus and ammonia. The main water contamination sources are

related to agricultural activities and wastewater discharges: urban wastewater contained 360,000 tons of organic matter and industrial wastewater 140,000 tons. The Sebou basin (30 per cent of water resources) is heavily polluted by untreated industrial and municipal discharge and agricultural run-off, specifically, nitrates and phosphorus. The rivers of the Sebou and Oum Er Rbiâ water basins experience critical situations during the drier seasons, as more than 50 per cent of the samples present degraded quality, although there is slight improvement in the wetter seasons (when 48 per cent of the stations show bad to very bad quality).

The water quality in the majority of dams was good to excellent, with the exception of the Kreima, Aride and Moulay Youssef reservoirs, located in the Bouregreg and Oum Er Rbiâ water basins. The degradation of the water quality of these reservoirs is mainly due to higher phosphorus concentrations.

Table 9.1: Water quality assessment criteria

Parameter	Very bad	Bad	Medium	Good	Excellent
Dissolved oxygen (mg/l)	< 1	1–3	3–5	5–7	> 7
BOD5 (mg/l)	> 25	10–25	5–10	3–5	< 3
COD (mg/l)	> 80	40–80	35–40	30–35	< 30
Ammonium (mg/l) NH ₄ ⁺ (mg NH ₄ ⁺ /l)	> 8	2–8	0.5–2	0.1–0.5	≤ 0.1
Phosphorus total (mg/l)	> 3	0.5–3	0.3–0.5	0.1–0.3	≤ 0.1
Faecal coliforms (/100ml)	-	> 20 000	2 000–20 000	20–2 000	≤ 20

Source: Joint order of the Minister of equipment and the Minister in charge of regional development, urban planning, housing and the environment No. 1275-02 of 17 October 2002 defining the water quality grid of surface.

Photo 9.1: Oum Er-Rbia River below Khenifra



Photo credit: Department of Sustainable Development

The country does not report on SDG 6.6, which addresses the protection of water-related ecosystems. However, data estimated by the Global Surface Water Explorer for UNEP provide some trends. In terms of changes in the water area of lakes and rivers over time, there was a 3.06 per cent change in 2006, a peak at 42.77 per cent change in 2015 and then a decrease to 22.38 per cent change in 2020. Data on lake water quality turbidity and trophic state show a relatively stable trend over time (table 9.3).

Groundwater

Based on the water quality assessment criteria, groundwater quality has changed significantly in recent years (table 9.4). Since 2007, groundwater quality of “average” and “very poor” has increased, while that of “poor” and “good” has decreased. However, “excellent” groundwater quality is rare or absent.

Aquifers

Aquifers are subject to two main pollution types: high nitrate concentrations and rapid salinity increase. While 54 per cent of the monitored stations present good to average quality indexes, the remaining 46 per cent of stations are of degraded quality.

High salinity levels exceeding the threshold allowed are observed in the coastal reservoirs, due to the overexploitation of groundwater resources and seawater intrusion.

Furthermore, important nitrate concentrations exceeding the 50 mg/l threshold and reaching a maximum of 200 mg/l are registered in the aquifers exposed to intense agricultural activities such as irrigation and the use of fertilizers and pesticides. This type of pollution affects the Témara, Maâmora, R'mel, Triffa, Chaouia, Beni Amir, Fès-Meknès, Doukkala and Mnasra aquifers.

Table 9.2: Assessment of surface water quality, 2007–2020, percentage

Period	Excellent	Good	Average	Poor	Very poor
2007–2008	6	37	18	18	21
2008–2009	12	35	22	14	17
2011–2012	4	50	17	17	12
2014–2015	5	49	17	18	11
2016–2017	1	40	29	16	14
2019–2020	1	41	24	14	20

Source: General Directorate for Water, 2021.

Table 9.3: Lake water quality turbidity and trophic state, 2017–2019, percentage

		2017	2018	2019
Turbidity	Low	67	65.84	66.51
	Medium	7.3	11.37	8.23
	High	5.96	9.61	8.32
	Extreme	19.75	13.18	16.94
Trophic state	Low	94.08	92.02	94.83
	Medium	4.57	6.62	3.47
	High	1.25	1.16	0.24
	Extreme	0.09	0.2	1.46

Source: <https://unstats.un.org/home/> accessed 2021.

Table 9.4: Groundwater quality, 2007–2020, percentage

Period	Excellent	Good	Average	Poor	Very poor
2007–2008	0	28	26	23	21
2008–2009	0	28	28	23	21
2011–2012	1	28	25	19	28
2014–2015	1	21	33	17	28
2016–2017	0	20	34	15	31
2019–2020	0	21	35	13	31

Source: General Directorate for Water, 2021.

Drinking water quality

The quality of drinking water demonstrated significant improvement in the last decade, being closely monitored by the ONEE for treatment and distribution and the Ministry of Health and Social Welfare for the impact on human health. More than 125 physical, chemical and microbiological parameters are analysed, ensuring, for the biological quality, that the threshold of 5 per cent is never exceeded for coliforms, and the sporadic deviations from bacteriological parameters are corrected without delay.

In the last decade, there have been problems with water quality related to the increase in mineralization, particularly in times of drought, and in water taste and smell, due to the consequences of the eutrophication of dam reservoirs and highly mineralized water and nitrate concentrations in the groundwater of certain catchments. Nevertheless, over the last decade, the physical and chemical parameters reported by ONEE for sites supplied by surface water resources were always compliant with the national standards regarding quality of water for human consumption; the sites supplied by groundwater were 99 per cent compliant for parameters with impact on human health. However, in 2018, WHO reported elevated levels of nitrates as an issue in Morocco's drinking water supplies.

ONEE has established procedures to address requests for exemptions in accordance with the provisions of the decree on water for food use (such requests are also sent to the Ministry of Health and Social Welfare), and a database to record trends in water quality control.

9.3 Water supply and demand

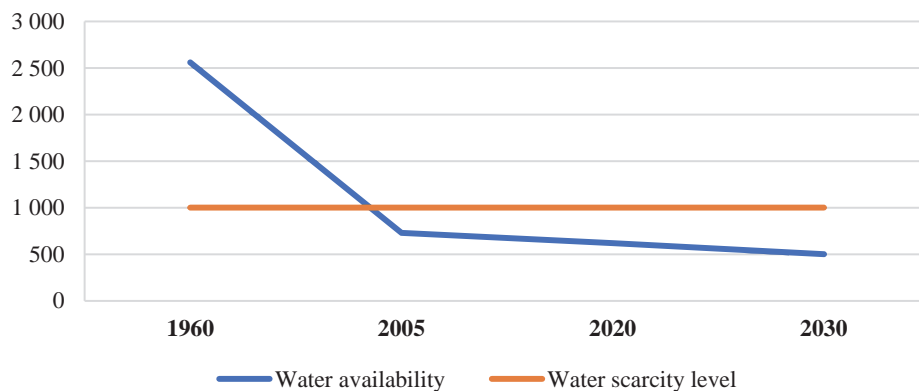
Water availability has dropped from 2,560 m³/person/year in 1960 to 730 m³/person/year in 2005 and 620 m³/person/year in 2020, below the water scarcity level of 1,000 m³/person/year. Water availability is predicted to drop to 500 m³/capita/year by 2030 (figure 9.1). In contrast, water demand is projected to grow from 14.3 billion m³ in 2010 to 23.6 billion m³ in 2030.

Agriculture consumes the largest quantity of water, accounting for 87.30 per cent of total water withdrawals, mainly through irrigation of large, small and medium-sized and private irrigation areas, but has an efficiency rate of only 48 per cent, indicating about 52 per cent of water losses. Supplying drinking water to urban and rural populations accounts for 8 per cent, while the drinking water system experiences a loss of approximately 30 per cent. On average, 32 per cent of groundwater is allocated to drinking water and 31 per cent fulfils agricultural needs. The water supply for industries and tourist establishments uses approximately 6 per cent of the total available national water.

Photo 9.2: Al-Hassan Addakhil Dam



Photo credit: Department of Sustainable Development

Figure 9.1: Water availability, 1960, 2005, 2020, 2030, m³/person/year

Source: General Directorate for Water, 2021.

Morocco mobilizes up to 90 per cent of the economically accessible surface water using dams and reservoirs. In 2020, the number of dams reached 145 with a total capacity of 18.6 billion m³. Further small dams are planned for construction to meet needs for drinking water, irrigation and livestock. However, the capacity loss of dams amounts to approximately 75 million m³/year due to siltation and leakage problems. The PNE recommends reducing losses, mobilizing surface water resources to meet the growing water demand for different uses, contributing to the socio-economic development of the country, and adapting to the impact of climate change on water resources, through the construction of 50 new dams here in order to allow the storage of approximately 1,200 million m³/year; these dams will be added to the 14 dams under construction and which should make it possible to store 616 million m³/year.

Furthermore, the PNE proposes reducing water losses in the existing dams due to structural erosion by maintaining and renovating the upstream terrain (surface area around 110,000 ha). The sedimentation volume of all large dams is estimated to be close to 75 m³/year, limiting the mobilized amount of water.

Other supply sources are considered promising non-conventional water sources and climate change adaptation measures. The PNE outlines desalination as a measure to address the gap between water supply and demand and proposes the construction of seawater desalination plants to produce nearly 515 million m³/year in 2030. In 2016, Morocco had 15 desalination facilities, with a total desalination capacity of 132 million m³/year. The wastewater reuse level is low, despite its high potential; it is estimated that, by 2030, the amount of wastewater produced will increase to 900 million m³. Of the total wastewater, 60 per cent is discharged directly into the Mediterranean and Atlantic Oceans and 40 per cent is discharged

elsewhere into the natural environment. The implementation of the PNAM and the PNE is a driver of supervised wastewater reuse. Eighteen wastewater reuse projects with a total yield of 38 million m³ are in operation and provide good quality water for the irrigation of green spaces, parks and golf courses (69.3 per cent), agricultural activities (13 per cent), industrial activities, in particular the extraction of phosphate (16.6 per cent) and the reconstitution of groundwater (1.1 per cent).

9.4 Performance and gaps in water monitoring networks

The hydrological monitoring network plays a decisive role in the management of the country's water resources, particularly in situations of drought and heavy rainfall. In order to meet the needs of sectors using water data, the hydrological network has been designed with the objective of having data on the spatial and temporal variability of the various climatological parameters (rain, temperature, evaporation, wind speed and direction, humidity, insolation) and hydrometric parameters (water level and flow of rivers and springs).

The measurement network has gone through several stages. The number of permanent hydrological stations has gradually increased, especially during the last four decades since the launch of the dam policy. Thus, the number of hydrometric stations increased from 35 in 1956 to 235 in 1996, reaching more than 325 hydrometric stations and 395 pluviometric stations in 2019. This increase in the number of hydrological stations has also been accompanied by a change in the role assigned to the hydrological network. The role shifted from providing hydrological data to designing and building various hydraulic infrastructures during the 1960s and 1970s, to a management tool for dams and reservoirs during the

1980s and 1990s, following the socioeconomic development of the country. The hydrological network has also played an important role in other areas such as land-use planning (for urban, tourism and industrial areas) and the sizing of engineering structures.

The piezometric network includes all the piezometric control points for groundwater aquifers, such as piezometers, boreholes and control wells. A reduced network, where measurements are done monthly, contains the most representative piezometers of each water table. As at July 2021, 251 piezometers have been installed nationwide. This activity made it possible to report on the inter-annual and seasonal changes in groundwater resources. The piezometric activity is the responsibility of the ABHs, which are responsible for setting up monitoring networks, carrying out campaigns and developing piezometric stations. In recent years, efforts have been made to improve measurement systems, such as making a gradual shift from manual measurement to automatic measurement systems and telemetry systems.

The ABHs are also responsible for monitoring and controlling the quality of water resources at the river basin level. The task is accomplished through analysis of the physical, chemical and biological parameters of the samples collected from monitoring stations, performed for two periods, at high and low water, for both surface water and groundwater, according to Ministerial Order No. 1275-02 of 8 August 2002. In 2017, the number of stations reached 202 surface water quality monitoring stations on 90 different rivers, 137 sampling stations on 58 reservoirs of dams and natural lakes, and 520 sampled water points for the monitoring of 45 main groundwater tables.

The water monitoring network systems provide valuable data to support decision-making. However, they are not sufficient to face the increasing challenges in the water sector. The scarcity of water and the effects of climate change could require more campaigns to monitor the quantity and quality of water resources and broaden the parameters that integrate ecological quality and hydrological analysis to comply

with the most recent trends in water resources monitoring. As at July 2021, the capacities of the ABHs are not adequate to enable them to overcome the existing challenges and fully fulfil their duties on controlling and monitoring water resources.

The country does not report on the level of implementation of integrated water resources management (IWRM) at all levels. The proportion of transboundary basins (river and lake basins and aquifers) with an operational arrangement for water cooperation (SDG indicator 6.5.2) was 0 per cent in 2020. Nevertheless, figures from UNEP present an improvement: 63.9 per cent of transboundary basin areas had an operational arrangement for water cooperation in 2017 and 71 per cent in 2020. This progress indicates the country's recent efforts towards meeting SDG target 6.5. The annual amount of official development assistance (gross disbursement) for water supply and sanitation in the period 2012–2019 averaged US\$234.63 million at 2019 constant prices (table 9.5) (SDG indicator 6.a.1).

9.5 Management of water use, developments in infrastructure, pressures on water resources and prevention of pollution

Industry, including industrial discharge

According to the PNE, the water demand of the industrial and tourism sectors was evaluated for 2050 at 476 million m³/year. Currently, and within the framework of updating the PNE, the industrial water demand is evaluated in 2020 at 241 million m³/year, which is projected to increase to 370 million m³/year for isolated industrial projects by 2050.

Even though industrial activities account for only 6 per cent of the total water demand, the sector's wastewater effluent has a heavy pollutant load. The total volume of industrial wastewater discharged is about 964 million m³ (around 87 per cent of consumed freshwater) which, by extension, significantly increases the water footprint of the industrial sector.

Table 9.5: Total official development assistance (gross disbursement) for water supply and sanitation, 2012–2019, US\$ million at 2019 constant prices

2012	2013	2014	2015	2016	2017	2018	2019
249.59	164.56	280.00	378.47	252.29	159.58	162.98	229.53

Source: OECD.

Photo 9.3: Idriss 1st Dam, Taounate Province, Fes-Meknes Region

Photo credit: Department of Sustainable Development

While the chemicals and paracheicals industries are the biggest polluters in term of discharged volume, they are not the main polluter. More than 50 per cent of the organic load is discharged by the food processing sector, most notably by the sugar industry, slaughterhouses, dairies, cheesemakers and oil mills. The food processing industries are concentrated in the Loukkos basin upstream of the El Makhazine River dam and threaten the quality of water at this dam. The characteristics of raw industrial wastewater effluents vary widely, depending on the type of industry, and indeed within each industry, depending on technologies and materials used.

All industrial discharges must comply with standards for effluent discharge. Efforts are still ongoing to develop standardizations for direct industrial discharge to the environment or indirect discharge to the public sewerage system through the National Industrial Hydric Pollution Plan (PNDIH). Since 2014, in its effort to promote the investment environment, the ministry responsible for industry created industrial zones and parks (chapter 14). These parks offer integrated infrastructure for industries. Clustering industries in zones increases the feasibility of wastewater treatment infrastructure with the possibility of applying economies of scale. It creates the opportunity to build common facilities for the treatment of industrial wastewater and for large-scale reuse of treated domestic wastewater in industries.

Mining

Morocco has nearly 259 mines exploiting different substances, almost 50 per cent of which are on the territories of Tensift ABH (17 per cent), Moulouya ABH (17 per cent) and Drâa Oued Noune ABH (13 per cent). The majority of the mines (42 per cent) exploit or have exploited metallic substances, of which 20 per cent mine industrial minerals such as phosphorus and salt; 18 per cent of mines exploit clay and derivative materials, and 18 per cent iron and manganese. Only four mines (2 per cent) have been inventoried in the solid fuel category.

Typically, mining sites are located close to a water source. For instance, 87 mines are located less than 2 km from a surface water source, four of which are located less than 2 km from a dam, and 37 of all mines are located directly over unconfined aquifers.

The majority of the operating mines use mine water in the closed circuit plant, but, in some cases, this mine water can be completely or partially discharged into the natural environment. This is the case with the Drâa Lasfar, Oumjrane and Tighza mines. Of the 6.4 million m³/year of mine water produced, 2.3 million m³/year are discharged into the natural environment, showing exceedance of the general discharge limit values for manganese by the Drâa Lasfar mine, and for

arsenic, zinc, manganese, nitrates and sulphates by the Tighza mines.

The effects of the tailing dams include the leaching of chemical substances through the infiltration of water from the dams (in the event of a sealing problem) or even directly following rupture of the dams, which, in the event of an accident, could cause the contamination of surface water and groundwater below and downstream of these installations. The tailings dams of the mines in operation are equipped with systems for collecting leakage or infiltrated water, composed of drains with manholes or water collection basins. Non-infiltrated water called "clear water" is routed to the water recovery system. Of all the operating mines studied in 2015 by the then Ministry of Equipment, Transport, Logistics, and Water, 14 mines had tailings dams, with an estimated total volume of water recycled of 13.15 million m³. This polluting load is controlled at the dams themselves, and its risk to water resources can only arise in the event of infiltration or breakage of the dams.

Wastewater from mines is of domestic origin, mainly dominated by shower water. The mines in Morocco have an autonomous or collective sanitation network, with the exception of the mines of Drâa Sfar and Tighza where raw wastewater is discharged directly into the natural environment; the other mines evacuate their discharges in either septic tanks or settling ponds where they will be subjected to primary treatment and will subsequently be conveyed to recycling systems. In 2015, the volume of wastewater produced by the mines in operation was evaluated at 1.07 million m³, with a total pollutant load of 36,576 kg/year of COD equivalent and 23,898 kg/year of BOD₅. These figures are not representative of the whole country since some mines did not communicate the volumes of wastewater produced.

Agriculture, including irrigation

According to the PNE, water demand for irrigation was assessed at nearly 12.04 billion m³ in 2010. This demand was re-evaluated in 2020, as part of the PNE, to 14.5 billion m³, including nearly 5 billion m³ for delineated large irrigated areas, 5 billion m³ for small and medium-sized irrigation areas and 4.5 billion m³ for private irrigated areas. By 2050, this demand is expected to increase to approximately 16 billion m³, distributed as 6 billion m³ for the large areas, 5.7 billion m³ for the small and medium-sized areas and nearly 4 billion m³ for the private areas, based on the rate of conversion to localized irrigation proposed by the Department of Agriculture.

The country's territory is around 71,085 million ha, of which agricultural, livestock and forestry lands cover less than 40 million ha. Arable land represents 12 per cent of the country's total area and 13 per cent of the irrigated land area. Irrigated agriculture is mainly based on dams and private irrigation. About 47 per cent of irrigation water comes from large dams, 23 per cent from small and medium-sized dams and 30 per cent from private irrigation sources. Gravity irrigation is still the most used irrigation system (more than 56 per cent of all irrigation), followed by local irrigation systems (around 37 per cent) and ground sprinklers (around 7 per cent). Drip irrigation has been adopted in the 2009 National Water Strategy with the aim of saving 2 billion m³/year of water by 2030.

Agricultural pollution presents heavy pressure on groundwater resources. This pollution results mainly from the use of fertilizers, inducing extremely high concentrations of nitrates in the aquifers, reaching 200mg/l. On average, 720,000 tons of fertilizer and 8,500 tons of pesticides are applied annually to cultivated areas.

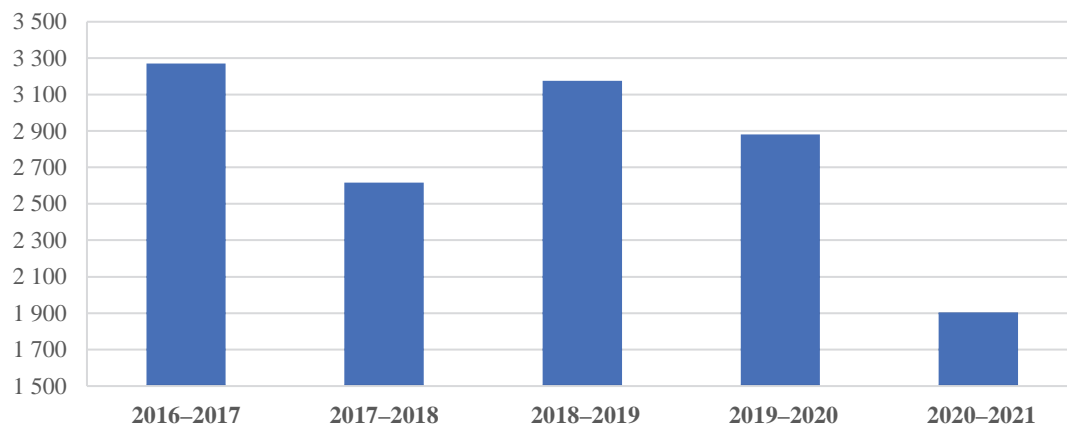
Figure 9.2 shows the irrigation water supplies for the ABHs of Loukkos, Moulouya, Sebou, Oum Er Rbiâ, Tensift, Sous-Massa, Drâa Oued Noun and Guir-Ziz-Ghriss.

Energy, including hydropower plants and reservoirs

All thermal power plants in Morocco are located by the sea, with the exception of the Ain Beni Mathar thermo-solar power plant (combined-cycle power plant with an integrated solar field with a capacity of 472 MW, of which 20 MW is solar), the combined-cycle power plant built near the Tahaddart River (385 MW), the Jerada coal-fired power plant and the Noor CSP solar power plants (at Ouarzazate and Midelt).

While surface water resources supply the Noor CSP solar power plants, namely from the Mansour Eddahbi and Hassan II dams, the thermal station of Jerada and the thermo-solar station of Ain Beni Mathar are provisioned by groundwater resources and expected to reach demand of 2 million and 0.85 million m³/year respectively by 2030.

In 2050, the water needs of power plants are expected to reach 10 million m³/year, considering the rehabilitation project of the Jerada thermal power station.

Figure 9.2: Evolution of irrigation water supply, 2016–2021, billion m³

Source: General Directorate for Water, 2021.

Transport

No information and data are available on the impact from transport on water in Morocco.

Households

Drinking water supply and treatment

In 2010, the demand for drinking water was evaluated at 985 million m³/year in urban areas and 256 million m³/year in rural areas. Currently, and within the framework of updating the PNE, the national demand for drinking water is evaluated in 2020 at 1,155 million m³/year in urban areas (17.3 per cent increase on 2010) and 320 million m³/year in rural areas (25 per cent increase). It is estimated to reach 1,734 million m³/year in urban areas and 390 million m³/year in rural areas by 2050.

There is general access to drinking water in both urban and rural areas: the percentage of households having access to safe drinking water has continually increased, from 91.4 per cent in 2015 to 93 per cent in 2018. In 2020, the connection rate is around 96 per cent in urban areas and 97.8 per cent in rural areas. The unit consumption of the connected population in urban areas was in the order of 80 l/capita/day and, considering overall allocation for all types of use combined, reaching 95 l/capita/day. This is represented in the evolution of consumer needs, which are increasing in urban areas, from 790 million m³/year recorded in 2017 to a projected 1,023 million m³/year in 2030 according to ONEE; 81 per cent of this is allocated to the drinking water needs of households while the rest is consumed by other urban administrative, recreational and industrial users.

However, according to the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation

and Hygiene of 2021, in the period 2012–2020, the proportion of the population using safely managed drinking water services increased from 67 per cent to 80 per cent, which represents a step towards SDG target 6.1. However, disparities still exist between urban and rural areas: use of safe drinking water increased from 89 per cent in 2012 to 91 per cent in 2020 in urban areas, and from 36 per cent in 2012 to 61 per cent in 2020 in rural areas.

To match the direct drinking water demand, water losses due to leakage issues in the distribution network are taken into account. This increased the water demand, corresponding to the production of 1,106 million m³/year in 2017, which is expected to reach 1,489 million m³ by 2030. While the production of drinking water relies mainly on conventional water resources, recent efforts are deployed to close the gap through the use of non-conventional resources such as desalination. The desalination contribution is modest, being 9.3 million m³ in 2017 and 8.9 million m³ in 2019, in contrast with 359 million m³ in 2017 and 369.2 million m³ in 2019 produced from groundwater resources, and 770 million m³ in 2017 growing to 827.9 million m³ in 2019 produced from surface water resources.

Appropriate treatments are implemented to produce drinking water according to the national and WHO standards of human consumption. All the resources used are treated according to the nature of the resource, ranging from simple disinfection and conventional treatment to extensive treatments. The specific processing treatment implemented in the water supply treatment plants includes the processes of iron removal and demanganization, pH correction, desulfurization, ammonium elimination and demineralization, in addition to reverse osmosis systems in the desalination plants. The existing process laboratories carry out water quality control at

the plants in each treatment station; additionally, periodic checks are carried out by the central and regional laboratories of ONEE.

Sewerage and wastewater treatment plants

About 76 per cent of the total population is connected to the sewerage network in 2019. The objective was to connect 330 towns and urban areas to wastewater treatment plants (WWTP). In 2019, 152 WWTPs were built and in 2022, 76 are in construction.

The total treatment capacity increased from 328.45 million m³/year in 2016 to 396.8 million m³/year in 2019. Only 26.3 per cent of the generated wastewater is subject to tertiary treatment, while eight centres in the coastal cities, with a total capacity of 2.9 million m³/year, are discharging pretreated wastewater to marine outfall. Wastewater quality in Morocco falls within the normal worldwide ranges, with a treatment efficiency of 55 per cent performed by the WWTPs, and up to 66 per cent when including pretreatment and marine outfall.

In 2016, 45 per cent of the total wastewater flows were treated safely. According to WHO, in 2020, the proportion of safely treated domestic wastewater flows was only 36.1 per cent. Data on the quality of water bodies reveal that, in 2017, 70 per cent of the surface water resources and 56 per cent of the groundwater resources were of good quality. These figures show that the country is still far from meeting SDG target 6.3.

With the different primary, secondary and tertiary process technologies, numerous different treatment combinations can be constructed. In Morocco, the dominant treatment technologies are natural ponds, trickling filters and activated sludge. However, the additional wastewater amount generated from the rainwater run-off increases the potential for non-conventional water reuse, such as rainwater harvesting. These reuse options require different water qualities that can be reached by using specific treatment technologies such as ultrafiltration and reverse osmosis.

The level of wastewater reuse is still low, even though the potential is very high, owing to the important volume of wastewater collected in urban centres. It is expected that, by 2030, the volume of generated wastewater will increase to 900 million m³. Of the total discharge to the natural environment, a significant volume of wastewater (60 per cent) is discharged directly to the sea, while around 40 per cent is discharged into the inland natural environment. According to the analyses and studies carried out by

governmental departments, estimates of the volume of reusable wastewater is expected to reach 325 million m³/year by the horizon of 2030.

The country does not report on water-use efficiency. However, according to FAO, efficiency was at US\$8.73 per m³ in 2018, compared with US\$6.27 per m³ in 2010 and US\$7.54 per m³ in 2015, demonstrating an increase in efficiency (SDG indicator 6.4.1). Regarding the level of water stress, in 2010, the proportion of freshwater withdrawal from available freshwater resources was 61 per cent. According to FAO, it was 50.75 per cent in 2018 (SDG indicator 6.4.2). Thus, the country is making progress toward the achievement of SDG target 6.4. The level of water stress relative to the baseline is high (up to 80 per cent), with Morocco ranked 22nd internationally by the World Resources Institute in 2019.

Landfills

No information and data are available on impact from landfills on water resources in Morocco.

Tourism and leisure

Touristic water demand was partially evaluated by the PNE in 2010 at 196 million m³/year for both tourism industries and projects. Currently, and within the framework of updating the PNE, the water demand was evaluated in 2020 at 33 million m³/year for tourist establishments and facilities and is expected to increase to 106 million m³/year for isolated tourism projects by 2050.

Specific evaluations and statistics on the impact of the tourism and leisure sector on water and development of related infrastructure are not established, as the majority of the pollution emanating from tourism projects is treated as either urban or industrial pollution.

Sludge

No sludge management initiatives are currently being implemented.

In Morocco, the annual amount of sewage sludge generated was about 98,000 million tons of dry solids in 2014. This was expected to increase to almost 110,000 million tons by 2020. Sludge management is an integral part of modern WWTPs. However, the problem of disposal, storage and reuse is still very problematic; it is important not to lose the nutrients in the sludge, make use of its material and energy and dispose of it efficiently and sustainably.

The technical potential for green valorization (in agriculture, forestry, green spaces and revegetation of quarries and landfills) is estimated at a minimum of 50 per cent of total disposal by 2020, equivalent to almost 55,000 tons/year. This estimation is based on the lagoon cleaning plans, the economically viable distance (transport, dryness) and the capability of soil for spreading. The theoretical energy potential is estimated to be 3 million MWh/year in urban areas. The technical energy potential was about 200,000 MWh in 2015, with the WWTPs of Fès and Marrakesh contributing more than 60 per cent. This potential is likely to reach 330,000 MWh by 2030. The practical and technical challenges of sludge handling are mainly linked to stabilizing the sludge (rendering it chemically inert and eliminating unpleasant odour), reducing the water content and sludge volume to the minimum, using the energy potential when economically possible, reducing the number of harmful microorganisms if people, animals or plants are in contact with the sludge, and phosphorus recovery for agricultural use.

The main constraints of sludge management and disposal are linked to institutional and regulatory aspects, namely, the lack of agreements between sludge producers and managers of final sludge disposal, and of national standards for sludge disposal and valorization since sludge disposal is not considered in the PNDM.

9.6 Impact from and adaptation to climate change

Morocco is particularly vulnerable to three types of climatic impacts: increasing temperatures, changes in rainfall patterns and increasing aridity. These impacts are associated with amplifying the frequency and intensity of extreme weather events, such as severe droughts and floods.

According to the PNE, the specific impacts of climate change on the water balance by 2050 will be an increase of up to 10 per cent in water demand for irrigation by 2050, and reduced water resources available due to a decrease in rainfall of up to 10 per cent in the major river basins (such as the Loukkos, Sebou, Bouregreg-Chaouia, Oum Er Rbiâ, Moulouya, Tensift, Souss-Massa), leading to a significant reduction in the exploitable surface water resources and a decrease of up to 10 per cent in the groundwater resources in those basins.

To fulfil the sustainability goals and capacity gains in the water sector, several initiatives and objectives have been set for 2030, 2040 and 2050 to face the known difficulties related to water supply and demand, the

water collection and distribution infrastructure, and the water quality component (as indirect objectives). Other direct adaptation objectives for the water sector are set, such as: the project for the mobilization and sustainable management of water resources in the priority areas of Tangier, Oujda and Meknès affected by climate change, by 2030; flood protection for medium and high-risk sites by 2040; and the creation of various programmes and actions aimed at preserving water resources and the natural environment, and improvement of the management of extreme climatic phenomena, for a total investment of US\$5.7 billion by 2050. Implementation of parts of Recommendation 7.3 of the first EPR are ongoing.

The national coastline is also exposed to the impacts of climate change as according to the World Bank, 42 per cent of the coastline will be at high risk of erosion and flooding by 2030. Sea level rise poses a threat for the coastal areas which concentrate 60 per cent of the country's population and economic activities.

9.7 Water basin management

The decentralized management of water resources in Morocco is ensured by the ABHs and by the participation of all stakeholders in the management and protection of water resources and the public hydraulic domain (DPH) at the basin level. Since 1995, 10 ABHs have been created to cover the duties and responsibilities related to knowledge, monitoring, evaluation, planning, management, preservation and enhancement of water resources and the management of exceptional situations such as floods and droughts.

To further strengthen good governance of decentralized and concerted management of water resources, Law No. 36-15 on Water mandates the creation of water basin councils (CBHs) as actors in each ABH. The Councils constitute a regional forum for discussion around the issue of water management and are in charge of examining and giving guidance on questions related particularly to water management, the PDAIRE and local PDAIREs. With the creation of the CBHs, Recommendation 7.1 of the first EPR suggesting the country reinforce IWRM at the institutional level has been partially implemented.

While the ABHs have become major players in their respective basins, experience shows, however, that the human and financial resources available to the ABHs are inadequate to cover all the extensive missions and the various aspects conferred on them by Law No. 36-15, in addition to the increasing challenges linked to the scarcity of water resources in a context increasingly marked by climate change.

The ABHs are thus facing numerous challenges related to the different aspects of water management. The establishment and adoption of certain application texts of Law No. 36-15 are facing delays, increasing the difficulty of applying important regulations, especially related to the principles of user pays and polluter pays. This also hinders ABHs when it comes to the self-financing of all the activities conferred on them by Law No. 36-15, due to the difficulties they encounter in collecting fees related to the use and exploitation of water from the public domain, but also the low rate of these concession fees. The first EPR recommended that the country reinforce IWRM at the policy and legal levels (Recommendation 7.2). This has been partially implemented.

Other challenges are closely related to the need to pool the limited resources and skills available for ABHs, making it difficult to establish an efficient organizational plan and to set up an integrated resources information system as a centralized tool for decision-making and open communication with stakeholders and the public. The nature and availability of resources and skills also affect day-to-day operations, notably in the small number of Water Police, making it difficult for ABHs to efficiently track and control all unauthorized exploitations.

While the list of responsibilities of the ABHs is growing with the increasing duties resulting from the complex aspects and new challenges of water management in Morocco, the aging hydraulic heritage and infrastructure must be subject to special attention in terms of upkeep and maintenance.

Regarding SDG target 6.b on the participation of local communities in improving water and sanitation management, the country does not report data. However, the country is meeting the objectives. According to the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water

(GLAAS) in 2019, the level of participation was high, both in the planning process for rural drinking water supply and for water resources planning and management. Law or policy that ensure the participation by service users in planning programmes in water resources planning and management was evaluated as well defined.

9.8 Flood management

A number of floods occur in different regions of the country. While the annual frequency is not high, the consequential damage is significant. Flash floods have become more frequent in the last decade due to the impact of climate change; nine major floods were registered during the period 2010–2019 (table 9.6).

Several initiatives have been launched as adaptation measures to climate change and for flood risk management, mainly evidenced in the relaunch of the study of the National Flood Protection Plan in 2010. This initiative counted the threatened areas of about 1,000 sites, including the new points that have experienced floods in recent years, while redefining the priorities and measures necessary to accelerate the implementation of the guidelines of the Plan on the ground.

Special attention is paid to the modernization of measurement and warning networks by adopting hydrological telemetry, along with creating and implementing a flood warning database in several hydraulic basins at the national level. Such database systems would provide the foundation for the development of flood zone maps and real-time hydrological forecasting models. In this regard, the DGE established a cooperation agreement with the Royal Centre for Remote Sensing to enable the use of satellite images as a fundamental means of decision-making in the field of flood management.

Table 9.6: Major floods, 2010–2019

Year	Date	Affected area	Region
2010	2010	Essaouira	Marrakesh-Safi
2014	Nov. 2014	Guelmim	Guelmim-Oued Noun
2015	Feb. 2015	Tangier Jebha	Tangier-Tétouan-Al Hoceima
2015	Feb. 2015	Chefchaouen Bni Smih	Tangier-Tétouan-Al Hoceima
2016	25–30 Oct. 2016	Laâyoune-Oued Sakia El Hamra	Laâyoune-Sakia El Hamra
2017	23 Feb. 2017	Rabat-Salé	Rabat-Salé-Kenitra
2017	1 Sept 2017	Midelt-Outerbate	Drâa-Tafilalet
2019	29 Aug. 2019	Taroudant	Souss-Massa
2019	7 Sept 2019	Errachidia	Drâa-Tafilalet

Source: General Directorate for Water, 2021.

Photo 9.4: Agadir wastewater treatment plant

Photo credit: Department of Sustainable Development

Also, a partnership with the Japanese International Cooperation Agency to equip the Ourika Valley with a flood protection and load warning system. Other international collaborations include a partnership between the Morocco and the European Union to improve flood risk management tools and skills, and another between Morocco and South Korea for the protection of the Sebou basin against floods.

Other measures focus on updating the 2016 Law on Water (No. 36-15) and preparation of a draft decree relating to the protection and prevention of floods and the management of related dangers; these would support the implementation of the National Strategy of Natural Disaster Risk Management, for the period 2020–2030 and the establishment of an integrated flood risk management assistance system, both in partnership with the Ministry of the Interior.

9.9 Legal, policy and institutional framework

Legal framework

Integrated management and governance of water find their foundations in the 2016 Law No. 36-15 on Water and its implementing texts. Other laws of a horizontal nature, such as laws aimed at the preservation of the environment and sustainable development, sectoral laws such as the Agricultural Investment Code (Dahir No. 1-69-25 of 1969) or laws relating to the

organization of local authorities, have provisions related to water governance.

Law No. 36-15 dictates the reforms of specific water legislation since the 1925 Dahir on the water regime, to complete, consolidate and clarify the provisions enacted in 1995 Law No. 10-95 on Water, which set the basis of integrated management and governance of water in Morocco. Law No. 36-15 sets the rules for the integrated, decentralized and participatory management of the resource to guarantee the right of access to water to all citizens and for its rational and sustainable use, and for better qualitative and quantitative valuation of water, aquatic environments and the DPH in general. The Law also determines the rules for preventing water-related risks to ensure the protection and safety of people, property and the environment.

Law No. 36-15 brings in new provisions, in particular:

- The inclusion of wastewater and desalinated water in the DPH, as well as the simplification of the delimitation procedures in this area;
- The definition of the uses and operations of the DPH subject to authorization or concession, while specifying the uses and operations exempt from authorization or payment of royalties;
- The improvement of water administration and strengthening of decentralized and participatory management through the creation of water basin

councils, clarification of the responsibilities of the High Council for Water and Climate, ABHs and prefectural and provincial water commissions, and the revision of their composition and mode of operation;

- Recognition of the PNE as a reference framework for the national water policy;
- The definition of a legislative framework for seawater desalination, the collection and recovery of rainwater, liquid sanitation (collection, treatment and discharges into the natural environment) and the preservation of aquatic environments;
- The strengthening of the legislative framework for flood risk management and water scarcity, the participation of partners and users in water management, and the establishment of water information systems at the level of hydraulic basins and at the national level;
- The strengthening of sanctions penalizing infringement of the provisions of the Law in order to improve the effectiveness of control of the use and exploitation of the DPH and the water resource.

The Law offers even greater visibility to decision-makers with a planning horizon of 30 years and strengthens the autonomy of ABHs in terms of water planning and management. Currently, the PDAIRE is being updated to take into account the latest innovations in Law No. 36-15, particularly in terms of water resources planning. Recommendation 7.2 (a) of the first EPR has been implemented while Recommendation 7.2 (b) is under implementation.

Law No. 36-15 was adopted in August 2016. The Law states that, pending the publication of the texts for its application, application of Law No. 10-95 remains in force. This means that the main implementing decrees of Law No. 10-95 remain applicable. Following the revision of Law No. 10-95, Law No. 36-15 constitutes, since its promulgation in 2016, the regulatory basis for the planning and management of water in the country.

Organic Law No. 113-14 gives municipalities responsibilities to build and manage the infrastructure required to supply public services in proximity to their territory, such as drinking water supply and sewerage. However, the municipalities can delegate these services to operators.

Policy framework

The PNE sets strategic guidelines at the national level in terms of the development of water resources and the alignment of sector strategies and programmes. A

PDAIRE is to be established at the level of each hydraulic basin. Local water management plans can be established to specify the measures to be taken to implement the prescriptions of the PDAIRE, and to promote the development of water resources, at the local level. As consultation and coordination among stakeholders is one of the principles of sustainable water management, the PNE is established according to a participatory approach involving the various ministerial departments and public institutions involved in the water sector at the national level.

The National Programme for the Supply of Drinking Water and Irrigation 2020–2027 aims at accelerating investments in the water sector over the period 2020–2027. The framework agreement for its implementation defines the conditions and modalities of executing and financing the National Programme, which aims to consolidate and diversify sources of drinking water supply, guarantee water security and address the effects of climate change. This Programme has an estimated cost of 115.4 billion dirhams and is based on five axes:

1. The development of water supply by:
 - Continuation of the construction of large dams by completing construction of the dams in progress and launching construction works for 20 new dams, with storage capacity to reach 27.3 billion m³;
 - The installation of three new seawater desalination plants;
 - The construction of small dams for local development with an annual budget of 600 million dirhams;
 - Ensuring the supply of drinking water through the improvement of existing and development of new water supply systems;
 - Prospecting for and releasing underground water resources to strengthen drinking water supply and water supply for livestock and irrigation.
2. Demand management and water valorization, essentially by continuing the efforts of the drinking water distribution operators to improve the yields of the distribution networks in cities and urban centres; continuation of the modernization of the irrigation networks and the collective reconversion to localized irrigation; and installation of hydro-agricultural equipment in the irrigated areas of the Gharb and Saïis plains.
3. The reinforcement of drinking water supply in rural areas through continuation of the implementation of programmes already under way for 160 centres and 10,818 *douars* (Bedouin tent settlements), and the implementation of

complementary programmes for 659 centres and 7,876 *douars*;

4. The reuse of treated wastewater, particularly for 21 golf course watering projects;
5. Communication and awareness-raising through the adoption of an institutional communication plan and development of a communication campaign for behavioural change targeting the general public.

The PNAM for the period to 2040 aims to enhance access to sanitation and wastewater treatment and promote the reuse of treated wastewater. The main target of the National Wastewater Programme for 2020–2030 is to fill the gap in wastewater treatment capacity and, ultimately, achieve at least a 60 per cent reduction of pollution caused by wastewater and improvement of the sewerage connection rate to 80 per cent in urban areas.

These programmes partly support the implementation of Recommendations 7.3 and 7.4 of the first EPR. These called on the country to make efforts to secure water supplies (Recommendation 7.3) and to protect human health, aquatic ecosystems and biodiversity through a number of measures to control discharges, such as the implementation of wastewater treatment strategies, the adoption of standards for the discharge of industrial and municipal wastewater into the environment, the management of sewage sludge, the

promotion of ecological flow regimes, and the control of nitrate concentrations in contaminated aquifers (Recommendation 7.4).

Institutional framework

Numerous players share responsibilities for integrated management, planning and governance of water at both the central level (ministries, secretariats, ONEE) and the local level (municipality-owned public operators, private concessionaires, irrigation operators, ABHs, municipalities) (figure 9.3).

The Interministerial Commission on Water is primarily responsible for coordinating sectoral policies and programmes in the water sector, setting priorities for the implementation of sectoral programmes and examining the major reforms envisaged in the water sector.

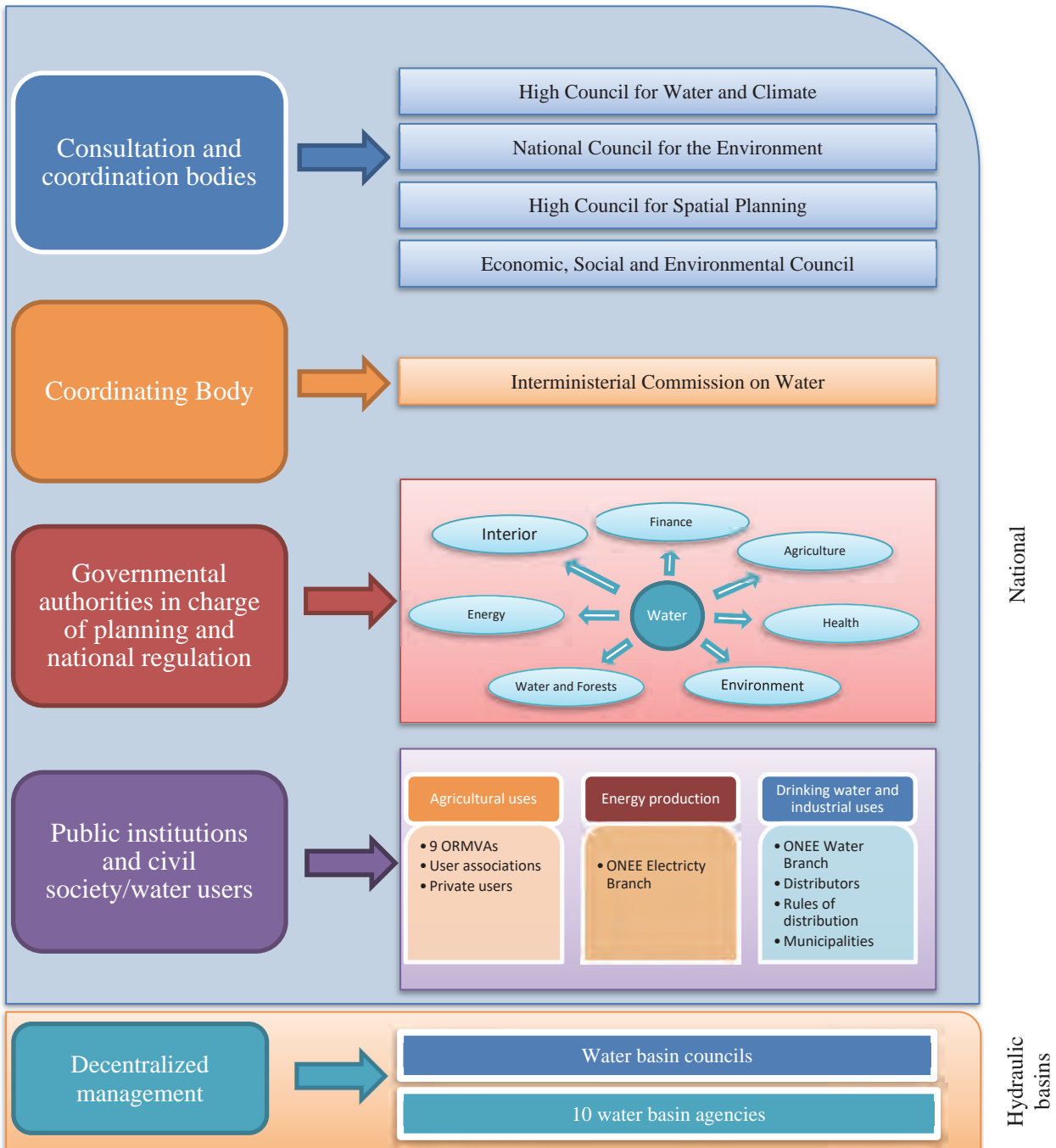
As consultative bodies, the High Council for Water and Climate, the National Council for the Environment, the Economic, Social and Environmental Council and the High Council for Spatial Planning analyse the various strategic and planning documents for the water sector and formulate recommendations for their adaptation to the national challenges. These bodies have been strengthened by the creation of CBHs, which constitute forums for the discussion of water issues at the regional level.

Photo 9.5: Marrakech wastewater treatment plant



Photo credit: Department of Sustainable Development

Figure 9.3: Institutional diagram of the water sector



Source: General Directorate for Water, 2021.

Note: ORMVA = Regional Office for Agricultural Development.

The ministries in charge of water, agriculture, the environment and the interior are involved in planning on water. Other ministerial departments are involved to varying degrees, in particular, the ministries in charge of finance, health, economic affairs, and water and forests. In addition, the ONEE Water Branch is in charge of water planning.

ABHs constitute the main administrative tool for water governance at the hydraulic basin level. Other institutions also play a role in regional water

management, including Regional Offices for Agricultural Development (ORMVAs) and the provincial services of the ministries in charge of water and agriculture. The regional authorities are also tasked to ensure the proper use of natural resources, their development and their safeguarding. The regional councils are tasked to establish a regional strategy for saving energy and water in accordance with the respective national strategies.

Financing the water sector

The water sector is financed mainly by the Government through different programmes and initiatives, with the support of several donors. Morocco's key development partners in the water sector are the ADB, World Bank, IsDB, Japanese Bank for International Cooperation, EIB, European Union, AFD, KfW, GIZ, European donor countries (such as Belgium and Spain), Arab Fund for Economic and Social Development, Japanese International Cooperation Agency, United States Agency for International Development (USAID) and Canadian Council for International Cooperation.

ONEE and KfW signed three agreements for a total amount of €69.5 million in 2018 to finance three drinking water supply programmes. The EIB has signed a €37.5 million (405 million dirhams) finance contract with ONEE to finance the rehabilitation and improvement of water supply and distribution infrastructure in Morocco. This is in addition to a previous agreement, concluded in 2019, under ONEE's 2019–2023 water infrastructure plan. This EIB financing falls under the European Union's external lending mandate and is part of the Team Europe programme's response to the health crisis. The total amount of the loan covers 90 per cent of the total project cost, which is exceptional as the EIB Statute normally limits this figure to 50 per cent.

Price adjustment could be an effective tool in water management because it signals to the consumer the true cost of the resource to society and thus allows the consumer to decide how much of the resource to use. To comply with the right of everyone to access water, the water tariff is established on the basis of socioeconomic data and may change with increased usage; thus, water supply and sewerage tariffs are set by Ministerial Order No. 2682-14 (chapter 3). Morocco has introduced a sanitation tax based mainly on the quantity of drinking water consumed. Environmental costs are not considered when calculating the price to be paid by the end user.

To offset the cost of water supply, the Government grants autonomy to public urban water authorities and authorizes the privatization of urban water supply in large cities. Similarly, the revolving fund that provides urban users with loans for the installation of water meters and the renovation of water equipment is an innovative way to enable urban users themselves to fund water saving.

Information

As at August 2021, access to and sharing of information with the public, stakeholders and official

entities is established through reports, official studies and seminars. Public information and awareness-raising campaigns are organized.

Water education and awareness is implemented through the Moroccan education system. However, awareness-raising on water issues is carried out mostly by NGOs. Over the last decade, ministries and government entities have digitized information through official websites. However, relevant data and information are not publicly available. Therefore, Recommendation 7.2 (c) of the first EPR remains valid.

The Department of Culture, through the INBA, organizes:

- Creative workshops to stimulate the creativity of INBA students to propose works that aim to raise awareness of the sensible consumption of water and its importance for the future of humanity;
- An annual competition for comics entitled “the drop of water in all its shapes” to raise awareness of the rationalization of water.

9.10 Assessment, conclusions and recommendations

Assessment

In Morocco, water resources are under rising pressure from demographic and industrial growth, irrigated agriculture, urbanization, overuse of aquifers and deterioration of water quality. Due to high water stress, Morocco was ranked 22nd internationally by the World Resources Institute in 2019. Climate change impact is increasing the challenges that the country faces regarding water scarcity, manifesting in the significant decrease in annual rainfall and the increase in drought events. Existing issues, such as water quality, water distribution and treatment infrastructure, efficient monitoring, and control of the implementation of existing regulations and revision of outdated ones, have not been upscaled.

Nevertheless, in the last decade, the water sector in Morocco witnessed numerous legal, political and institutional changes, marked mainly by the adoption of Law No. 36-15 on Water as a profound revision of Law No. 10-95 on Water, to reflect the current challenges facing the country and reinforce PDAIRES. However, not all the legal texts for its application are adopted, and the delay in development and adoption slows down the implementation of certain aspects such as the user-pays and polluter-pays principles.

The Ministry of Equipment and Water is the national water authority responsible for the coordination of integrated water management. However, numerous key players are involved on the institutional and regulatory levels according to their specific water needs and priorities, thus indirectly dictating the direction of aspects of water management. The exchange of information is limited and irregular and does not ensure optimum control, efficient management of water resources, and the capacity for each of the institutions to intervene to enable better convergence of the various programmes and action plans.

In addition, the list of challenges facing ABHs is growing with their mounting responsibilities in correlation with the increasing challenges of the water sector. Therefore, the consolidation and coordination of activities and programmes on the river basin level is still the recommended approach to reducing the institutional fragmentation and enforcing efficient performance concerning resources regulation in the management of all water bodies, namely, in water allocation permits, inspection and implementation.

Some steps are set to improve water management, stressing the need to involve everyone with a role or interest in water management in the planning and decision-making process. These include the establishment of water user associations, the introduction of education and training initiatives and awareness-raising campaigns aimed at the general public. There is a lack of awareness in the agricultural sector regarding good practices to minimize drought damage, reduce losses and increase water-use efficiency in irrigation schemes.

Since the last EPR in 2014, the country has implemented Recommendation 7.1 urging it to reinforce integrated water resources management at the institutional level, with the creation of the CBHs following the adoption of Law No. 36-15. Recommendations 7.2, 7.3 and 7.4, targeting other aspects of water resource management, as well as water-use efficiency, treatment of the different aspect of wastewater and control of the quality of water flow and nitrate concentration, are being implemented.

Morocco has made progress in achieving SDG 6, especially SDG targets 6.1, 6.2, 6.4, 6.5 and 6.b. A large proportion of the population has access to safe drinking water and sanitation (targets 6.1 and 6.2). The country has also slightly increased its water-use efficiency (target 6.4). According to UNEP, IWRM reached 71 per cent in 2020 (target 6.5) and the participation of local communities in water and sanitation management is assessed as high (target 6.b).

However, the country is still not on its way to reach several targets. There are still disparities between urban and rural populations in terms of access to safe drinking water, sanitation and hygiene (targets 6.1 and 6.2). The treatment of wastewater (target 6.3), which reached 36.1 per cent in 2020 according to WHO, and water-use efficiency (target 6.4), with US\$8.73 per m³ in 2018 according to FAO, present low figures. The country does not provide data for the protection of water-related ecosystems (target 6.6). The lack of data also hinders possibilities to assess the country's achievement with respect to several targets.

Conclusions and recommendations

Legal framework

The main implementing decrees of Law No. 10-95 remain applicable pending an inventory of those rules that would be inconsistent or contradictory with the provisions of the 2016 Law on Water (No. 36-15).

Recommendation 9.1:

The ministry responsible for equipment and water should prioritize the adoption and implementation of all the legal texts of the Law on Water.

Integrated water resources management

Practical challenges exist for the implementation of an efficient, vertically integrated water resources management regime at the river basin level covering all aspects of the water sector. These challenges are related to a lack of human and financial capacity.

Recommendation 9.2:

The Government, through the ministry responsible for equipment and water, should:

- (a) *Provide support for the water basin agencies to upscale their resources and upgrade the tools and skills used;*
- (b) *Ensure cooperation at the water basin level among the actors concerned and align the priorities among the stakeholders.*

Water sustainability

While the climate change component receives dedicated attention and efforts, no attention is given to the ageing hydraulic infrastructure. The agriculture sector uses, on average, 86 per cent of total water withdrawals, but water losses are as high as 52 per cent. Water sustainability is not promoted through the efficient use of the existing resources and the development of standards and practices supporting the implementation of related measures.

Additionally, climate change highlights the need for more rigorous and efficient control of water quality due to the known and experienced correlation between drought events and deterioration of water quality. The revision of the water quality norms and standards is the way forward, in addition to upgrading monitoring and control systems.

Recommendation 9.3:

The Government should:

- (a) *Update water quality norms and standards to meet the international standards;*
- (b) *Enforce more frequent control and monitoring, especially regarding water resources quality, drinking water quality, and the exploitation of the water resources;*
- (c) *Maintain and upgrade the hydraulic infrastructure to reduce water losses;*
- (d) *Ensure the efficient use of water resources;*
- (e) *Strengthen the measures for artificial recharge of aquifers.*

Sludge treatment

The PNAM for the period to 2040 is making significant progress on increasing the rate of connection to sewerage systems and construction of WWTPs, and thus, the rate of urban wastewater treated; however, the rate of industrial wastewater undergoing treatment remains low, as does compliance with the water quality requirements. While the treated urban wastewater presents significant potential for substantial water reuse as a non-conventional resource, the actual volume of water reused is still modest, and more can be done in terms of regulation to promote and encourage water reuse.

Sludge is not valorized for industrial and agricultural uses but presents a danger to the environment and human health if untreated. While sludge treatment is performed for big urban sites, its disposal and valorization are not enforced at the municipal level. No strategic document on sludge management is developed.

Recommendation 9.4:

The Government should:

- (a) *Promote the creation and implementation of national standards for sludge disposal and valorization;*
- (b) *Prepare a technical manual on good practices in sludge management;*
- (c) *Develop a national plan for the management of sludge from WWTPs that sets out the*

- institutional and financial arrangements for all sludge disposal and recovery streams;*
- (d) *Develop a legal and normative framework for the treatment and reuse of sludge from wastewater treatment plants and accelerate the revision of the decrees and orders related to sludge reuse further to the Law on Water;*
- (e) *Upgrade information and knowledge of sludge valorization processes and techniques;*
- (f) *Promote agreements between sludge producers and managers of final sludge disposal.*

Water information

Accessibility to and the quality of data and information remain challenging for the water sector in Morocco; this includes limited use of data and information to support decision-making and lack of public access to published studies and statistics. No national water information system aimed at achieving and improving the collaboration among the ABHs, institutional bodies and stakeholders involved is in place.

Recommendation 9.5:

The Government, in cooperation with the High Commission for Planning, should:

- (a) *Develop a national water information system, covering all the data and information on all aspects of water, to serve as the centralized system used by all decision-makers;*
- (b) *Ensure recent and up-to-date availability, publication and access to data and reports related to all aspects of water management;*
- (c) *Ensure public access to information on water quality and quantity to increase transparency and awareness.*

Public awareness on water issues

Public awareness of the challenges faced by the water sector is vital for sustainable water management, especially in the rural areas and the agriculture sector. Public access to recent information and the creation of frequent documentation aimed at the public user would increase transparency.

Recommendation 9.6:

The Government should advance and support public education and awareness to increase the efficiency of water use.

Chapter 10

WASTE MANAGEMENT

10.1 Practices and trends in waste management

Waste data

In Morocco, population growth, rapid urbanization, improvement in the standard of living of the population and changes in consumption patterns have led in recent years to an increase in the production of household waste, the overall quantity of which is estimated, at the end of 2019, at around 7 million tons/year (5.5 million tons/year in urban areas and 1.5 million tons/year in rural areas). Despite the annual increase in the quantity of waste produced in Morocco, the management of this waste, particularly household waste, has experienced a notable improvement in recent years insofar as the cost of environmental degradation due to non-management management of such waste increased from 0.5 per cent to 0.4 per cent of GDP between 2003 and 2014 according to the reports of studies carried out with the support of the World Bank respectively in 2003 and 2014 on the cost of environmental degradation..

Recommendation 8.2 of the first EPR of Morocco, which suggested the HCP and the Ministry of the Interior, in cooperation with the then Ministry of Energy, Mines, Water and Environment, set up a system to collect data on generation and disposal of municipal and industrial waste according to international waste classification, is not implemented as at April 2021.

Municipal solid waste and similar waste, including from tourism

For the years 2017–2019, the Department of Sustainable Development estimated the amount of generated municipal solid waste (MSW) in urban areas at 5,817,115 tons, an increase of 2.6 per cent on the estimation for 2014 (5,667,961 tons). For the rural areas of the country the same publication calculated 1,615,930 tons for the years 2017–2019. Thus, the

estimated total volume of MSW generated in the country is 7,433,045 tons, which is used for the years 2017–2019 in the absence of other data or estimation.

The latest calculation was done in a study within the framework of the drafting of the SNRVD, according to which the estimated amount of MSW generated in 2015 was 5,936,393 tons in urban areas and 1,533,491 tons in rural areas (table 10.1), giving a daily average of 20,465 tons generated in 2015. According to the same study, the total amount of all waste generated – MSW, industrial waste, and construction and demolition waste – was estimated at 26.8 million tons in 2015 and is expected to increase and reach 39 million tons by 2030, an increase of 45 per cent.

The collection rate of MSW in Morocco has increased rapidly in the last decade, from 45 per cent in 2008 to 86 per cent in 2017, and by 2021 it has further increased by 10 percentage points to reach 96 per cent, exceeding the 90 per cent target set by the PNDM for 2022. This is the result of the consistent implementation of the PNDM and the steady commitment by the Government in the form of financial contributions, which is reflected in the fact that 72 per cent of the total budget foreseen for the implementation of the PNDM was aimed at improving the MSW collection services. Private companies are mandated by municipalities to ensure delegated management of waste, including the collection.

In many countries, women have a pivotal role in waste management because they are usually in charge of waste in households and sometimes at the community level.²⁶⁹ Waste management is also a way to generate income through collection and recycling activities, of which an important part in this sector tends to be informal, with women restricted to the lowest-level jobs. In Morocco, women are involved in the everyday generation and handling of waste and the informal sector accounted for 92 per cent of waste collection in 2014.²⁷⁰

²⁶⁹ www.unep.org/resources/report/gender-and-waste-nexus-experiences-bhutan-mongolia-and-nepal?_ga=2.192910122.1476236221.1613481409-1073780860.1611924022.

²⁷⁰ www.retech-germany.net/fileadmin/retech/05_mediathek/laenderinformationen/Marokko_RA_ANG_WEB_Laenderprofile_sweep_net.pdf.

Table 10.1: Waste deposit by source, 2015 and 2030, tons

Region	MSW		Industrial waste		Construction and demolition waste	
	2015	2030	2015	2030	2015	2030
Tangier-Tétouan-Al Hoceima	624 356	1 050 240	660 648	1 834 593	4 178 828	3 052 321
Oriental	431 690	603 490	150 811	378 189	1 060 409	1 829 435
Fès-Meknès	745 694	1 064 517	295 550	578 482	1 229 576	1 598 452
Rabat-Salé-Kenitra	948 262	1 373 363	249 009	547 132	2 332 216	790 231
Beni Mellal-Khenifra	355 218	470 274	103 912	213 649	202 655	1 609 289
Grand Casablanca-Settat	1 484 755	2 211 581	3 292 614	7 104 244	1 492 248	1 996 191
Marrakesh-Safi	564 340	830 970	177 063	350 651	1 619 968	440 020
Drâa-Tafilalet	147 943	199 463	47 612	101 761	596 521	2 115 208
Souss-Massa	438 931	681 070	372 481	738 391	471 096	259 598
Guelmim-Oued Noun	75 996	732 751	22 469	43 522	259 541	396 427
Laâyoune-Sakia El Hamra	89 626	131 317	78 453	151 525	518 122	160 195
Eddakhla-Oued Eddahab	29 580	69 998	16 886	32 945	89 889	1 398 248
Total (urban areas)	5 936 393	9 419 033				
Total (rural areas)	1 533 491	1 987 105				
Grand total	7 469 884	11 406 138	5 467 508	12 075 084	14 051 069	15 645 614

Source: National Waste Reduction and Recovery Strategy, 2019.

Photo 10.1: Separate waste collection, Essafa primary school, Mohammedia prefecture, Casablanca-Settat Region



Photo credit: ECE EPR Team

Morocco faces an increase in the amount of waste generated, especially at the municipal level. The country has adopted a set of laws and strategies to face the challenge of increasing waste. However, the gender aspect is mostly absent from these texts and programmes.

Several examples of successful projects show how women can contribute to better waste management while benefiting from economic empowerment. Khaoula Renmal's ENRD2-Engrais Bio project aims at using organic waste to generate potential energy. In its circular economy approach, the project matches the country's ambition to green its economy. To promote the use of recycled bags rather than single-use plastic

bags, the Department of Sustainable Development implemented a pilot programme in 2011, promoting the use of canvas bags produced by women's cooperatives. The programme creates double benefits. Environmentally, it helps to reduce the use of non-recyclable bags, and economically, it provides decent income for the canvas bag producers. And in the country's largest landfill, located near Rabat, the creation of the cooperative Attawafouk has resulted in better safety conditions and more regular income for informal workers, including around 20 women.²⁷¹

However, gender-sensitive indicators are not used sufficiently and gender awareness in the waste-related projects and information campaigns is still low. This affects the habits of households and the education of children on waste management.

Landfilling

Considering the high collection rate of MSW (96 per cent) and relatively high landfilling rate (63 per cent), it can be stated that Morocco is performing well in fulfilling SDG target 11.6 and indicator 11.6.1.

To implement waste management overall, 67 provincial MSW management master plans need to be prepared to cover the whole territory of the country. The report of the implementation of the PNDM shows that 51 master plans had been completed and 13 are in the process of preparation. After the master plans are completed, work will continue on investing in upgrading landfills and landfill and recovery centres (Centre d'Enfouissement et de Valorisation des déchets (CEVs)). The name given to CEVs suggests that, besides controlled landfilling, they cater for sorting activities – given that the precondition for waste recovery is the sorting of waste. However, source separation of MSW is still not conducted on a large scale in Morocco but, rather, on a project level, and thus there is not enough sorted waste for continuous recovery operations in CEVs. As of end of 2021, 26 CEVs and controlled landfills were built.

The Marrakesh CEV started operation in January 2019. The total investment was 131 million dirhams. It is located in the region of El Mnabha, 35 km north of Marrakesh and covers an area of approximately 182 hectares. It receives MSW and similar waste. It is not only a modern landfill but also has a sorting unit. This centre can receive 900 tons of waste daily for the more than 20 years of its envisaged operation, including 70 tons of MSW from neighbouring local authorities, within the framework of the agreement on the joint operation of the CEV. The centre is expected to

achieve a recovery rate of 39 per cent of waste through the recycling of metals, glass, plastic and paper and the production of organic fertilizers and alternative fuels.

According to the SNRVD, communicated in April 2019, it is expected that there will be 50 CEVs by the end of 2022, achieved partly by upgrading the existing landfills into CEVs and partly by new projects exclusively focused on the opening of CEVs rather than landfills. However, based on the status of 29 projects as at February 2021, it remains highly improbable that the target of that plan will be achieved, given that it would require the completion of 21 new projects in less than two years (table 10.2).

Although Recommendation 8.3 of the first EPR urged the Government to promote mechanical-biological treatment of waste, in particular to stimulate recycling and the effective use of existing composting facilities, mechanical-biological treatment of waste and composting is still not performed, except at the Oum Azza (near Rabat) and Marrakesh landfills, despite the opening of several new CEVs. This Recommendation has been partially implemented but remains valid. Although new landfills and CEVs have recently been opened, environmental monitoring is not performed in and around them, nor around official dumpsites. Recommendation 8.4 of the first EPR, that the then Ministry of Energy, Mines, Water and Environment ensure that environmental monitoring is performed around landfills and dumpsites, has not been implemented and remains valid.

Recommendation 8.5 of the first EPR suggested the Government conduct a study on the costs of the landfills under operation and development for the duration of their expected life cycles and based on the results, ensure that a landfill tax is sufficient to cover the post-operational monitoring and rehabilitation of the landfills. No such study was prepared, so this recommendation has not been implemented and remains valid; such a study is even more necessary given that, in the context of decentralization, municipalities will need to be well aware of the actual costs of operating landfills. From 2008 to the end of 2021, the PNDM has enabled the following achievements:

- The increase in the professionalized collection rate to 85.2 per cent in 2021 compared to 44 per cent in 2008;
- The increase in the rate of disposal in CEV and controlled landfills to reach 63 per cent of the household waste generated in 2021, compared to 10 per cent in 2008;

²⁷¹ https://knowledgehub.unsse.org/wp-content/uploads/2019/06/299_Arib_Des-solutions-sociales-et-innovante_Fr.pdf.

- The establishment of 26 CEV and controlled landfills for the benefit of the following cities: Fez, Oujda, El Jadida, Essaouira, Rabat, Berkane, Figuig, Guelmim, Al Hoceima, Agadir, Nador, Dakhla, Mohammedia, Laayoune, Ifrane, Es-Smara, M'Dieq-Fnideq, Safi, Khouribga, Meknes, Ouarzazate, Marrakech, Khénifra, Beni Mellal, Tangier and Boujdour;
- The rehabilitation of 49 uncontrolled landfills for the benefit of certain cities including: Salé, Témara, Oujda, Benslimane, El Jadida, Fès, Essaouira, Casablanca, Al Hoceima, Agadir, Ifrane, Azrou, Mohammedia, Nador, Guelmim, El Oualidia, Tamsia, Ouled Taïma, Azilal, Akkreuch, M'dieq, Fnideq, Errachidia, Ouarzazate, Bouznika, Dakhla, Tarmigt, Sidi Moumène, Khénifra, Mrirt, Aguelmous, Marrakech, Sidi Allal Bahraoui, Guercif, Jerrada, Laayoune, El Ouatia, Moulay Bouselhame, Missour, Mehdiya, Tata, Akka, Foulahcen,

FoumZguid, Kélaat Sraghna, Ben Taïb, Al Jabha, Souk Larbâa du Gharb and Oued Nachef.

Separation and sorting

The study on the SNRVD drafting has underlined that the potentially recyclable amount of the MSW generated in urban areas in 2015 was 1,446,136 tons while the actual amount of waste recycled was 343,971 tons (almost 24 per cent of potential). These figures indicate that the recycling rate compared with the total volume of MSW generated in urban areas was 6 per cent in 2015. The estimation assumed that the share of recyclable waste is negligible in rural areas. In 2017, when the implementation of the PNDM was evaluated, the recycling rate was estimated at 10 per cent. These are the latest available data for the related SDG target 12.5 and indicator 12.5.1 and make it difficult to assess Morocco's progress towards achievement of this target.

Table 10.2: Projects for the construction of landfills or landfill and recovery centres

	Location	Population served	Capacity (t/year)	State of progress (works and contracting)
CEV	Fès	1 129 768	346 750	Operating
CEV	Oujda	506 274	146 000	Call for construction and operation bids launched
Landfill	El Jadida	312 275	88 905	Operating
Landfill	Essaouira	106 515	30 325	Call for construction and operation bids launched
CEV	Rabat	2 011 041	912 500	Call for construction and operation bids launched
Landfill	Berkane	182 690	54 750	Operating
Landfill	Figuig	69 122	19,679	Operating
Landfill	Guelmim	139 246	39,643	Operating
Landfill	Al Hoceima	137 369	98 185	Operating
Landfill	Agadir	508 155	273 750	Operating
Landfill	Mohammedia-Benslimane	403 194	237 250	Operating
Landfill	Nador	392 623	111,780	Operating
Landfill	Dakhla	106 277	30 257	Operating
Landfill	Lâayoune	235 649	67 089	Operating
Landfill	Khouribga	377 760	107,548	Call for construction and operation bids under preparation
Landfill	Ifrane	84 485	24 053	Operating
Landfill	Es-Smara	57 035	16 238	Delegation of the operation contract is in progress
Landfill	Safi	345 890	98 475	Delegated management contract awarded to ECOMED
Landfill	M'diq-Fnideq	198 018	56 376	Delegated management contract awarded to SOS
CEV	Marrakesh	980 548	346 750	Operating
Landfill	Ouarzazate	113 752	32 385	Works completed; delegation of the operation contract is in progress
Landfill	Meknès	687 575	230 238	Operating
Landfill	Khenifra	228 567	65 073	Operating
Landfill	Tangier	1 005 041	380 000	Delegated management contract awarded to AVERDA
Landfill	Beni Mellal	326 008	127 750	Operating
Landfill	Boujdour	42 651	12 143	Operating
CEV	Targuist			Works completed; delegation of the operation contract is in progress
CEV	Tétouan			Works in progress; delegated management contract awarded to ECOMED
CEV	Taza			Works in progress; delegated management contract awarded to SNTRO

Source: National Waste Reduction and Recovery Strategy, 2019.

Note: CEV = Landfill and Recovery Centre

According to the 2019 WWF report, “Stop the flood of plastic – A guide for policy-makers in Morocco”, only 10 private recycling facilities were operating in Morocco.²⁷² The low recycling rate in the country was a consequence of the low profitability of the sector; this in turn was due to the lack of a steady supply of high-quality plastic waste as a result of the low separate collection rate. Although Morocco implemented a ban on plastic bags in 2015, the ban has not affected the large informal market for plastic bags due to low enforcement and inspection measures. The effect of the lack of financial incentives for separate collection and recycling of waste is demonstrated in the report: collecting plastic bags for recycling costs 20,000 dirhams/ton, while the cost of virgin plastic production of plastic bags is about 12,000 dirhams/ton.

In 2017, there was officially just one sorting centre in operation, at the Oum Azza landfill. It serves Rabat while the CEV in Rabat is under construction. Two waste-to-energy recovery experiments using biogas were also operational, in Oujda and Fès. According to the Secretariat of State for Sustainable Development (SEDD), in February 2021, seven CEV-type landfills were operating or under construction.

MSW collection is conducted by private companies, usually based on medium-term contracts; currently, however, these contracts do not contain a target rate for the at-source sorting of waste that the service provider must achieve. Even in cases where at-source sorting was available and tested, the collection companies were not motivated to do it because it would decrease the amount of mixed waste they collected.

The example of the Oum Azza landfill shows that the current financing of MSW collection and treatment does not make selective sorting and waste recovery in Morocco economically viable for private companies. It is one advanced landfill, which is equipped with a mechanical sorting unit for recyclable material. Organic waste partly produced refuse derived fuel, which is used as an alternative fuel in the nearby cement factory, and also recovered as compost. Oum Azza landfill was the first to employ formerly informal waste pickers in its sorting centre. Despite its advanced features, the company that operated the landfill since its opening in 2008, as well as the collection services in Rabat, ceased to provide these services from July 2020 because it could not reach profitability.

Industrial waste

Industrial waste for the year 2015 was estimated at 5,467,508 tons, with the Casablanca-Settat Region by far the largest generator (3,292,614 tons, or 60 per cent). Based on the same methodology, it is estimated that the volume of industrial waste will more than double, to 12,075,084 tons, by 2030. Non-hazardous industrial waste is generally disposed of in the landfills of the factories or on public landfills, except when it can be used for energy recovery (e.g., used tyres), in which case it is co-incinerated in cement factories.

Waste from the energy sector

Morocco does not report on waste from the energy sector.

Construction and demolition waste

Construction and demolition waste for the year 2015 was estimated at 14,051,069 tons, with the Tangier-Tétouan-Al Hoceima Region the largest generator (4,178,828 tons, or 30 per cent), followed by Rabat-Salé-Kenitra (2,332,216 tons, 17 per cent). Based on the same methodology, it is estimated that, in 2030, the volume of this waste type will be only slightly higher, at 15,645,614 tons, although the study does not explain the reason for such moderate growth.

Mining and quarrying waste

Morocco has a large mining industry with its own solid waste treatment system. However, Morocco does not report on mining and quarrying waste.

Agricultural waste

A 2013 study on the potential of organic waste and energetic valorization in Morocco²⁷³ estimated the total annual volume of organic agricultural waste differentiated by source, for the purpose of analysing the biogas production potential in Morocco. Results included:

- 18 million tons/year of waste from agricultural residues, of which 84 per cent originated from cereals;
- 68 million tons/year of waste from livestock breeding;
- 455,600 tons/year of sewage sludge from agriculture;

²⁷² http://awsassets.panda.org/downloads/05062019_wwf_marocco_guidebook.pdf.

²⁷³ www.researchgate.net/publication/271643713_Potentiel_des_dechets_organiques_et_valorisation_energetique_au_Maroc, 2013.

- 400,000 tons/year of waste from the dairy industry, based on 2010 dairy production data;
- About 505,800 tons/year of waste from olive oil production in the form of liquid residues (oil mill wastewater);
- 3,810,633 tons/year of waste from slaughterhouses.

In order to facilitate the recovery of waste from the olive sector (oil mill wastewater) after the production of olive oil and olive pomace, in 2015, the Ministry of Agriculture and Marine Fisheries and the Ministry of Economy and Finance agreed to provide financial support for vegetable water recovery projects (e.g., experiments in oil mill wastewater recovery by spreading it on agricultural land). Based on these experiences, a new, broader partnership was established for the period of 2020–2024 with the involvement of more ministries and Interprolive, the Moroccan Interprofessional Olive Association. The total allocated budget for the implementation of this agreement is 185 million dirhams, the SEDD being one of the main financing bodies (60 million dirhams over five years). At the operational level, regional partnership agreements were established (or are in progress), especially in regions with high potential for olive oil production.

Except for the oil mill wastewater project, there were no other government initiatives to facilitate the systemic treatment of agricultural waste. Pilot projects by the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests to manage the plastic waste from agriculture were ongoing as at February 2021.

Hazardous waste

Aggregated data or estimation on hazardous waste production does not exist in Morocco, except for the diagnosis of hazardous waste in Morocco developed as part of the project of National Centre for the Disposal of Special Waste. However, the classification of the Moroccan Waste Catalogue, an estimation for the year 2015 was calculated by aggregating the following waste streams: used batteries, waste electrical and electronic equipment (WEEE); and used lubricant oils (used tyres are not classified as hazardous waste) (table 10.3).

According to Environment Live, Morocco generated 119,000 tons of hazardous waste in 2000 and almost 290,000 tons in 2013. However, there are no more recent data to enable assessment of Morocco's progress towards SDG target 12.4 and indicator 12.4.2 (a) and (b).

Medical waste

Information describing the situation regarding medical waste is lacking. The amount of medical waste generated was first estimated in 2013 at 7,642 tons/year for categories 1 and 2, and 15,801 tons/year for category 4. Estimations by region and type of health-care institution indicated that 46 per cent of waste was generated in hospitals and 26 per cent in clinics or polyclinics. Since then, no updated estimation or actual measurement of waste generation has been constructed in the country.

Table 10.3: Breakdown of waste deposits by sector and by region, 2015, tons

Region	Plastics	Paper and cardboard	Ferrous metals and aluminium	Glass	Used tyres	Used lubricating or lubricant oils	Used batteries	WEEE
Casablanca-Settat	392 598	457 896	347 047	73 166	18 146	64 368	4 868	31 750
Rabat-Salé-Kenitra	88 632	111 032	242 282	21 242	9 032	30 166	2 423	18 711
Fès-Meknès	61 484	78 156	59 511	15 418	4 498	16 201	1 207	14 732
Tangier-Tétouan-Al Hoceima	59 976	73, 642	47 175	14 061	4 047	15 486	1 086	14 478
Marrakesh-Safi	50 935	64 166	26 033	12 373	3 489	13 175	936	14 266
Souss-Massa	39 542	49 953	22 581	9 630	3 478	11 484	933	9 059
Oriental	37 499	47 327	16 480	9 218	2 809	10 387	754	8 890
Beni Mellal-Khenifra	28 596	36 307	15 735	7 215	1 445	6 963	388	7 027
Laâyoune-Sakia El Hamra	13 613	16 844	8 858	2 832	690	2 723	185	4 233
Drâa-Tafilalet	13 438	16 363	2 900	3 247	330	1 534	88	1 524
Guelmim-Oued Noun	5 616	7 601	2 280	1 520	147	667	39	1 482
Eddakhla-Oued Eddahab	2 238	2 962	898	592	69	550	18	804
Total	794 169	962 249	791 780	170 515	48 180	173 704	12 925	126 958

Source: National Waste Reduction and Recovery Strategy, 2019.

Medical waste in categories 1 and 2 is treated using technologies and processes that reduce its harmfulness and danger to health (table 10.4). Infectious waste (category 1) can be treated by autoclaving, sterilization, chemical disinfection and physicochemical treatment. Waste in category 2 is mostly treated by incineration.

The treatment of infectious waste (category 1) is shared among hospitals and three private treatment companies (box 10.1). Each establishment uses a specific treatment process. Hospitals nationwide are equipped with ECODAS T300 sterilizing mills (each with a treatment capacity of 117 tons/year) which, at the end of the process, produce treated shreds that can be assimilated with household waste and simply returned to the urban waste sector. This process combines crushing and sterilization in the same closed

and compact enclosure. Sterilization comes after grinding and takes place at a temperature of 138 °C and under high pressure of around 3.8 bar. The total installed treatment capacity on a national level in 2015, related only to category 1 medical waste, was 16,556 tons/year for eight hours of daily operation and 33,112 tons/year for 16 hours of daily operation, meaning that the capacity greatly exceeds the quantity of category 1 medical waste generated.

The treatment of category 2 waste is mostly by incineration. Morocco faces issues with this method due to the fact that incinerators are badly maintained and not used properly, and therefore the majority are not functional. Currently, this waste is either exported abroad for treatment or managed together with MSW.

Table 10.4: Classification of medical waste

Category	Subcategory	Description	Type of medical waste treatment
Category 1. Infectious waste	1.a	Waste presenting a risk of infection because it contains viable microorganisms or toxins which may cause disease in humans or other living organisms	Autoclaving Sterilization Chemical disinfection
	1.b	Pungent or sharp material intended for abandonment, whether or not it has been in contact with a biological product	Physicochemical treatment Trivialization (banalization)
	1.c	Incompletely used, spoiled and expired blood products and derivatives for therapeutic use	
Category 2. Chemical or biological waste	2.a	Unused, spoiled, or expired drugs and chemicals and biologicals	Incineration
	2.b	Cytostatical and cytotoxic waste	
Category 3.		Human or animal organs and tissues easily identifiable by a non-specialist	Those which are identifiable by a non-specialist are buried according to the religious rites and the regulations in force. Those which are not identifiable are treated and eliminated according to the methods of category 1.a
Category 4.		Waste similar to MSW	Disposal on landfills or dumpsites

Source: Decree No. 2-09-139 of 21 May 2009.

Box 10.1: Medical waste treatment companies

TOZONE DASRI, located in Ain Attig-Témara, uses an Ecosteryl-125 device. The waste is first crushed to obtain particles less than 20 mm, then it is heated to 100°C then cooled under suction air and poured into a container. This treatment provides waste comparable to MSW that can be either disposed of by incineration or landfilled. The company has a pretreatment capacity of around 730 tons/year with eight hours of daily operation or 1,460 tons/year with 16 hours of daily operation. In 2013, the company treated 876 tons of medical waste from 49 hospitals.

Athisa Maroc, with two processing sites, one in Tétouan and one in Bouskoura, operates autoclaves. However, the Bouskoura site has opted for the physicochemical treatment known as MIMO. In Tétouan and Bouskoura, autoclaving allows the medical waste to be sterilized at high temperatures and then crushed and compacted in a skip that will be disposed of in landfill. The autoclave has a capacity of 1,460 tons/year for eight hours of daily operation and 2,920 tons/year for 16 hours of daily operation in Tétouan. At the Bouskoura site, the physicochemical process makes it possible to treat medical waste of categories 1 and 2. This process consists of the grinding of waste, which is treated with a variety of suitable oxidants, making it possible to destroy the pathogenic microorganisms of category 1 waste and to render the active molecules of category 2.a waste inert. The company manages medical waste from 43 hospitals. The Saïs Environnement company located in Meknès uses a Logmed-type device to process medical waste collected from nine hospitals. This treatment process consists of crushing the waste and sterilizing it for final recovery in a container. This has a processing capacity of 1,168 tons/year for eight hours of daily operation or 2,336 tons/year for 16 hours of daily operation.

Photo 10.2: El Jadida Landfill, Casablanca-Settat Region*Photo credit: Department of Sustainable Development*

Radioactive waste

Radioactive waste is generated from the use of radioactive material in the form of sealed and unsealed radioactive sources in industry, medicine, education and research organizations. Morocco operates a nuclear research centre, the Centre of Nuclear Studies of Mâamora (CENM) with a 2 MW TRIGA MARK II research reactor and facilities to treat radioactive waste generated nationally. There is also waste generated by the phosphate mining industry, which contains only naturally occurring radioactive materials, but this kind of waste is not declared as radioactive waste by the law.

Therefore, phosphogypsum is not handled by the National Centre for Nuclear Energy, Science and Technology (CNESTEN) but by OCP. However, Law No. 142-12 on Nuclear and Radiological Safety and Security and the Creation of the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR) has a full section dealing with naturally occurring radioactive material and technologically enhanced naturally occurring radioactive material assigned to AMSSNuR to quantify the risk associated with this kind of waste and to develop specific regulation.

Morocco has a radioactive waste system dealing with low- and intermediate-level radioactive waste, equipped with the necessary equipment and infrastructure capable of treating and storing it. The licensed installations that conduct activities involving radioactive material perform the interim storage on their sites of all generated radioactive waste until its transfer to CNESTEN. Waste collected by CNESTEN is treated in its installation located in CENM in Mâamora.

The aqueous radioactive effluents are treated by evaporation, while solid wastes are segregated into compactable and non-compactable waste before drum compaction in a 120-litre drum. Organic waste is solidified and conditioned in a 120-litre drum. The matrix used in the immobilization of waste is cement.

The preparation and management of a comprehensive national radioactive waste inventory has been assigned to AMSSNuR, which received the relevant software (RAIS) for this purpose from the IAEA in 2007. This software is developed by the IAEA to assist its Member States in managing their regulatory activities in accordance with IAEA Safety Standards and guidance, including the Code of Conduct on the Safety and Security of Radioactive Sources and supplementary guidance. AMSSNuR has trained its

staff on the use of RAIS. The preparation of the national inventory was still in process as at March 2021. The future inventory is expected to give accurate information about used sealed radioactive source (SRS) and disused SRS (DSRS), the status of which is pending due to their ongoing return to their suppliers or transfer to the national interim storage facility.

Meanwhile, the current inventory is prepared by CNESTEN and includes an estimation of the quantity of DSRS collected by CNESTEN (table 10.5).

Table 10.5: Disused sealed radioactive source collected by CNESTEN by category of radioactivity, as at October 2017, number

Cat 1	Cat 2	Cat 3	Cat 4	Cat 5	Total
3	62	200	64	800	1 129

Source: CNESTEN.

Persistent organic pollutants waste

No report on POPs is available in Morocco except for those of studies launched on empty pesticide packaging.

Specific streams

Recommendation 8.6 of the first EPR recommended the Government study the possibility of implementing collection and recycling systems for waste with a high pollution risk, to prevent informal collection and disassembly, and consider, on the basis of the experience gained so far (e.g., with packaging waste) promoting the principle of extended producer/importer responsibility, especially for WEEE. This recommendation is partially implemented, given that the Government, particularly the SEDD, has undertaken a number of initiatives for the establishment of extended producer responsibility schemes for selected, most-polluting waste streams, including WEEE, but an adopted legal framework for these extended producer responsibility schemes is still lacking.

Studies carried out for the drafting of the SNRDV estimated the amount of selected waste streams that need to be covered by further actions in order to start working on establishing the conditions for their recovery. The recycling and recovery targets and related activities are defined by the PNVD. For some waste streams, the current, and either estimated or actual, recycling rates were also provided in this study.

Paper

Morocco's annual paper and cardboard consumption is approximately 15 kg/capita/year, resulting in 500,000 tons of paper consumption per year; as the amount of actually recycled paper is 155,000 tons/year, the recycling rate is 30 per cent. Most of the paper and cardboard is collected and managed by wholesale intermediaries and intermediate processors, and in the informal sector by itinerant waste pickers, uncontrolled waste pickers and landfill pickers. Only industrial waste pickers' status is regulated.

The Government (the SEDD, the Ministry of the Interior and the then Ministry of Industry and Trade) entered into partnership in 2015 with the Federation of Forest Industries, Graphic Arts and Packaging (FIFAGE), in order to begin organization of the regulated value chain for this waste stream.²⁷⁴ The result of this initiative is unknown.

Glass

The total volume of glass waste was estimated at 170,515 tons in 2015, which was predominantly generated within MSW: of 118,727 tons of recyclable glass waste, 16,740 tons were recycled, resulting in a 14.1 per cent recycling rate. Industrial glass waste was estimated at 51,786 tons, of which 7,301 tons were recycled, resulting again in a 14.1 per cent recycling rate. Despite the widespread efforts by the Government, and especially the SEDD, to initiate and implement the organization of recovery value chains for the selected, economically most significant and most viable waste streams, as at 2021, there were no such attempts aimed at organizing a recovery system for glass in Morocco.

Plastics, including plastic bags

The Government took several steps to reduce plastic waste and discourage citizens and industry from the use of plastic packaging. As a first step, it introduced an ecotax at sales, exit of the factory and imports of plastics and products using plastics within Chapter 39 of the Harmonized System in 2013. In parallel with this, the following actions took place in order to improve plastic waste management in Morocco:

- Preparation of a study on the good governance of this waste stream;
- Preparation of the operational manual on the environmental tax;
- Establishment of the conditions for the attribution of ecotax income by ministerial order;

²⁷⁴ www.challenge.ma/trois-conventions-dans-la-valorisation-ecologique-des-dechets-57503/

- Identification of 20 waste sorting and recovery center projects, to be financed by ecotax revenues (18 projects with municipalities, 5 of which have been completed, 8 in progress and 5 planned and 2 projects with associations, one of which is in progress;
- Allocation of 85 million dirhams by the Ministry of the Interior to support the campaign on collection of plastic bags;
- Organization of workshops in 2011 and 2018 at the regional level, co-financed by GIZ and Ministry of the Interior, to strengthen the capacities of local authorities in sustainable waste management;
- Preparation of terms of reference for projects supporting microenterprises and SMEs and cooperatives involved in sorting, conditioning and recovery of waste.

Morocco was among the first countries to take seriously the pollution caused by plastic bags. This was mostly a reaction to the country's enormous consumption of plastic bags and its impact on the environment, which threaten serious consequences not only for the natural environment and human health but also tourism and the fishing industry. According to a 2019 WWF study on plastic waste in Morocco (box 10.2), before introducing the ban on plastic bags in 2015, Morocco was the second highest consumer of plastic bags per capita in the world, consuming more than 900 plastic bags per person annually. The Government started to regulate the plastic bag market as early as 2009, when the then ministry responsible for industry developed the mandatory standard that prohibited the manufacture and use of bags made of black plastic. In 2010, Morocco banned the use of nondegradable or nonbiodegradable plastic bags (Law No. 22-10). However, mostly due to the large illegal

market in plastic bags, this measure was insufficient to achieve the expected results. Thus, in 2015, Morocco opted to ban the use of all types of plastic bags. In parallel with the ban, the Government has launched a national campaign to collect and incinerate the plastic bags collected at cement kilns., supported by a massive awareness-raising campaign. These actions resulted in the collection of 7,000 tons of plastic bags in 2016.

Waste electrical and electronic equipment

The amount of WEEE was estimated at around 121,000 tons/year in 2014 and 126,958 tons in 2015, with an estimated annual growth rate of 3.5 per cent. The Government has ordered a study aimed at diagnosing the WEEE sector and preparing an organizational plan and a financing mechanism for the subsector of waste from IT equipment and telecommunications.

Based on the findings of this study, the Government signed a partnership agreement with the Moroccan Association of Professionals for Recovery and Elimination of Industrial Waste (AMVEDI) in March 2019, to establish and operationalize the ecological recovery sector for WEEE. The first actions arising from this partnership were smaller campaigns with awareness-raising activities for the collection of WEEE generated by public administration (tested first in Rabat), the organization of action for WEEE collection at the household level based on a smartphone application (tested first in Casablanca) and improvement of the treatment of WEEE generated by public administrations. The results of these pilot actions (e.g., amounts collected, number/rate of institutions or households involved) remains unknown, as do the lessons learned and further steps.

Box 10.2: "Stop the flood of plastic – A guide for policymakers in Morocco" (WWF, 2019)

Plastic pollution is one of the key issues underpinning WWF's Mediterranean Marine Initiative. Hence, it published "Stop the flood of plastic" in 2019 on the Mediterranean Sea and its adjacent regions, supplemented by country reports, including one for Morocco with in-depth analysis and a policy roadmap. The report made several detailed scientific estimations of plastic consumption and plastic pollution in Morocco. The findings included:

- Before the implementation of the ban on plastic bags, on average, Moroccans used 900 plastic bags annually per capita, the second highest level of consumption globally;
- 55 per cent of plastic waste generated in Morocco is leaked into the natural environment. Leakage is primarily the result of uncollected waste (25 per cent of all waste) and openly dumped waste (36 per cent of all waste);
- In 2016, almost 30,000 tons of waste leaked into Moroccan waters;
- 71 per cent of leaked plastic waste is generated through coastal activities;
- Morocco's economy loses an estimated US\$26 million annually due to plastic pollution, as it affects the tourism, shipping and fishing economies.

In order to provide solutions and identify best practices in the fight against plastic waste pollution, WWF has also expanded its Plastic Smart Cities initiative in several selected cities around the Mediterranean. Tangier in Morocco has joined this initiative.

Photo 10.3: Wastewater treatment plant, El Jadida Landfill, Casablanca-Settat Region*Photo credit: Department of Sustainable Development*

Used lubricant oils

Used lubricant oils are classified as hazardous in the Moroccan Waste Catalogue. The recyclable amount of such oils was estimated at 173,704 tons in 2015, while the actual recycled amount was 62,534 tons, resulting in a recycling rate of 36 per cent.

Used tyres

In parallel with the augmentation of the vehicle fleet in Morocco, the volume of used tyres is also growing. An estimated 48,180 tons of waste were generated in 2015, while 20,235 tons were recycled, resulting in a 42 per cent recycling rate.

In order to increase the recovery rate through co-incineration in cement factories, a partnership has been established between the key actors in the vehicle and tyre industries, namely, the Association of Vehicle Importers in Morocco, the Grouping of Heavy Goods Vehicles and Bodyworks (GPLC),²⁷⁵ the Association of Moroccan Tyre Importers (AMIPA) and the Professional Cement Industry Association.

In 2014, these stakeholders and the Government agreed on the establishment of a management scheme for this value chain and waste stream based on the following principles:

- The sector will be managed by an economic interest group (GIE) specially established for this purpose;
- The GIE selects the collectors for the collection of used tyres according to prescribed specifications;
- Tyres collected will be sent to one of the five collection centres to be established;
- Tyres will be ground down and sent to the recovery units drawn up according to well-defined specifications;
- For the financing of these activities, an ecotax on imported tyres and vehicles will be introduced;
- Cement manufacturers will bear the costs of grinding and the costs of transferring the tyres from collection centres to cement factories.

The used tyres sector has not yet established due to the lack of adoption of the proposed financial mechanism, namely the eco-tax on used tyres.

²⁷⁵ Groupement des Poids Lourds et de Carrosseries.

Used batteries

The vehicle fleet in Morocco has been growing steadily since the beginning of the 1990s and has clearly accelerated since 2005, resulting in the growing generation of waste from used batteries. In 2015, the potentially recyclable amount of such waste was estimated at 12,925 tons, while the amount actually recycled was 3,231 tons, resulting in a 25 per cent recycling rate.

Sorting and recycling of batteries was mostly done by the informal sector, whose waste treatment and burning practices had not only negative effects on the health of workers and those living nearby the dumpsites or areas where these activities were carried out but also created an informal economic sector with an estimated turnover of 60 million dirhams. In order to remedy this situation and regulate the sector and the waste treatment processes, in 2014, the SEDD launched an initiative for the establishment of a so-called ecologic value chain for used batteries, in partnership with a group of battery producers and distributors, based on the principle of extended producer responsibility. The partnership agreement envisaged the introduction of the following steps:

1. Collection and transport of used batteries by approved companies and authorized collectors according to a regional breakdown established in advance;
2. Distribution and elimination of used batteries in authorized sites;
3. Establishment of a management body for this value chain by involving the representatives of the producers of batteries in Morocco, the members of the administration of other sectoral actors concerned, as well as the representatives of the departments of responsible ministries of the environment, industry and finance.

Also, the integration of the informal sector has begun, by employing those involved partly in the newly built and opened CEVs where this waste is still sorted out from MSW and partly at the battery producers' plants that recycle such waste.

End-of-life vehicles

Two studies were carried out in 2018 and 2019 with financial support from AFD in order to prepare an analysis of end-of-life vehicle (ELV) management in Morocco (such as the identification of actors involved, assessment of the number of ELVs and their past disposal, and analysis of the legal framework governing the sector) and to prepare the master plan for the organization of this waste stream.

An intergovernmental coordination committee has been formed comprising representatives of the five ministries concerned with the regulation of this waste stream and operationalization of the related master plan. The master plan draws up a five-year roadmap for the period 2019–2023 for the implementation of the extended producer responsibility scheme for the ELVs stream in Morocco.

10.2 Transboundary movement of waste

The legal framework for the transboundary movement of waste has been completed in 2020 with the adoption of Ministerial Order No. 1339-20 (14 July 2020) on establishing the list of non-hazardous waste that may be authorized for import. Previously, Decree No. 2-17-587 (10 December 2018) on setting the conditions and modalities for the import, export and transit of waste defined the conditions in conformity with the Basel Convention and introduced the obligation of financial guarantee for these activities.

The importation, utilization or transportation of radioactive material is subject to a licence from the regulatory body. The owners of radioactive material are responsible for the safety and the security of this material and for the management of the radioactive waste resulting from its use. The most important companies dealing with scrap metal are equipped with a fixed portal monitoring system to detect radioactive material inside vehicles transporting scrap before entering facilities. Morocco has also equipped its two biggest port authorities with a fixed portal monitoring system to detect any suspicious radioactive material in scrap metal coming from abroad.

10.3 Pressures from waste

Morocco does not assess pressures from waste since environmental monitoring is not performed in and around landfills and CEVs, nor around official dumpsites. However, problems caused by pollution of the environment, especially the quality of air, water and soil, by official and illegal dumpsites are well known by the affected residents, wider public and Government and well covered by the media.

One of the most reported examples of pressure from waste is the Mediouna dumpsite near Casablanca. Despite being already full in terms of its (surface) capacity, it is still used by the local waste collecting company for the dumping of waste. It continues to accumulate waste to tens of metres in height, accentuating the risk of groundwater pollution due to the flow of leachate (it is estimated that 150,000 m³/year of leachate reaches the groundwater). It also continuously emits smelly and toxic gases and fumes

originating from the burning of the waste. From time to time, these fumes are blown by the wind towards the residential areas of Casablanca. In addition, the landfill is located near several *douars*, whose populations already suffer from cardiovascular and dermatological diseases. Hundreds of waste pickers work illegally and under very difficult conditions at this dumpsite.

10.4 Legal, policy and institutional framework

Legal framework

Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development is aimed at giving a legal basis to the provisions of the CNEDD. In terms of waste management, this framework updated the legislative framework relating to waste with the aim of strengthening aspects related to the reduction of waste at the source, establishment of a selective waste collection system, promotion of waste recovery techniques, integration of the principle of extended producer responsibility and ecological management of hazardous waste. This guidance is essentially aimed at preventing and combating all forms of pollution and nuisance caused by waste.

The 2015 Law No. 77-15 on prohibiting the manufacture, import, export, marketing and use of plastic bags specifies mandatory standards for plastic bags, below which domestic production, imports, sales or free distribution are forbidden.

The 2006 Law No. 28-00 on Waste Management and Disposal established the basis of a comprehensive waste management policy in Morocco with the dual objective: (1) to modernize the management processes and infrastructure in the waste sector; and (2) to reduce the adverse impacts of waste on the health of the human population and the environment. It was followed with a series of implementing regulations regulating the application of the provisions and the subsectors of waste management. It should be noted that WEEE is regulated, as hazardous waste, by Law No. 28-00 and its decree and order relating to the management of hazardous waste. This law is in its role being amended to introduce the principle of extended producer responsibility as stipulated by the framework law No. 99-12, and this, to further strengthen the regulations relating to the management of this flow of this type. of waste streams.

Decree No. 2-07-253 of 18 July 2008 on the classification of waste and setting the list of hazardous waste promulgates the application of articles 29 and 83 of Law No. 28-00. It also classifies waste according to its nature and origin in the Moroccan Waste

Catalogue. In addition, it defines the list of hazardous characteristics of waste. According to this decree, medical (and pharmaceutical) waste is classified as hazardous waste, with the exception of that which can be assimilated with household waste.

Decree No. 2-09-139 of 21 May 2009 relating to the management of medical and pharmaceutical waste (MPW) promulgates the application of article 38 of Law No. 28-00, which provides that MPW is subject to specific management. This decree defined the terms for medical waste and classified it into four categories. It also determines the methods of sorting, packaging, storage, transport and disposal of waste that is similar to MSW.

Decree No. 2-09-284 of 8 December 2009 setting the administrative procedures and technical requirements relating to controlled landfills promulgates the application of articles 48 and 49 of Law No. 28-00. Its purpose is to define:

- The procedures for opening, transferring, substantially modifying or closing the controlled landfills;
- The technical requirements that must be respected in order to set up a controlled landfill in terms of site choice and its development;
- The operating conditions of the landfill to guarantee safety, hygiene and surveillance.

Decree No. 2-09-538 of 22 March 2010 setting the modalities for the development of the national master plan for hazardous waste management promulgates the application of article 9 of Law No. 28-00 designating the governmental authority in charge of the environment as the authority responsible for the development of the national master plan for hazardous waste management and responsible for establishing an ad hoc committee, known as the National Hazardous Waste Committee, whose mission is to give an opinion on the draft plan proposed by the governmental authority in question.

Decree No. 2-09-683 of 6 July 2010 promulgates the application of articles 10 and 11 of Law No. 28-00, which provides for regional planning for the management of non-hazardous waste that is not assimilated to household waste (including, in particular, non-hazardous medical waste). It establishes the modalities for the development of the regional master plan for the management of non-hazardous industrial, medical and pharmaceutical waste, ultimate waste, agricultural and inert waste and the procedure for organizing the public inquiry relating to this plan.

Decree No. 2-09-285 lays down the procedures for drawing up the prefectural or provincial master plan for the management of household and similar waste.

Decree No. 2-12-172 of 4 May 2012 setting the technical requirements relating to the disposal and recovery processes of waste by incineration promulgates the application of the article 83 of Law No. 28-00 relating to waste incineration. This decree defines the technical requirements to be respected when planning and operating waste incineration facilities for disposal, as well as the conditions and requirements that must be met by facilities for recovering heat or energy (co-incineration facilities). It also defines the procedures for managing solid residues from incineration operations, as well as the procedures for monitoring these installations.

The legal framework for hazardous waste has been completed with the adoption of Decree No. 2-14-85 of 20 January 2015 on the management of hazardous waste and the related Ministerial Order No. 3184-15, which defines the conditions for the collection, storage, transport and treatment of such waste. The 2011 Decree No. 2-09-85 on the collection, transport and treatment of certain used oils specifies the technical conditions for the used oil management chain. The 2015 Ministerial Order No. 2850-15 sets specific requirements relating to the collection and recovery of used batteries.

Policy framework (strategies, programmes, action plans, and their implementation)

National Household Waste Programme

The main national strategy in the domain of waste management remained the PNDM, adopted in 2007 as a result of strong intersectoral collaboration and dialogue among the key ministries concerned. The PNDM was designed as a three-phase programme covering the three main aspects of solid waste management, with the following objectives: expanding and professionalizing collection services, building (and modernizing) disposal facilities, and promoting recycling activities. The PNDM set the goals for a 15-year period and defined clear objectives for the year 2022. The key targets are:

- Increasing the coverage of solid waste collection from 70 per cent to 90 per cent;
- Increasing the rate of landfilling in urban areas to 100 per cent (on sanitary landfills);
- Closing and/or rehabilitating all the dumpsites (their number was estimated at 300);

- Developing sorting, recycling and recovery activities in order to reach the recycling rate of 20 per cent (of all waste produced).

The following non-measurable targets were also defined:

- Supporting the municipalities in the effort to professionalize services;
- Raising awareness and training stakeholders concerned with the issue of solid (household) waste;
- Generalizing the master plans for solid waste management for all the prefectures and provinces of Morocco.

The initial cost of realization of the PNDM was estimated at 40 billion dirhams, of which 67 per cent was foreseen for the improvement of collection and cleaning services and 17 per cent for investments in infrastructure (controlled landfills). According to the latest available review, of August 2017, 16.4 billion dirhams were already spent, including 4.4 billion dirhams of support provided by the State to the municipalities (territorial communities). Local authorities contribute 73 per cent of the total cost of the Programme.

In 2021, achievements under the PNDM were:

- An increase in the professional collection rate to 96 per cent, from 44 per cent in 2008;
- Preparation of 45 regional master plans for household and similar waste management, of the 64 planned;
- Two waste-to-energy experiments using biogas carried out in Oujda and Fès;
- Creation of a sorting centre at several landfills, including Oum Azza, which serves Rabat;
- Increasing the rate of disposal in controlled landfills and CEVs to 63 per cent of household waste generated, from 10 per cent before 2008;
- The realization of 26 controlled landfills and CEVs;
- The rehabilitation of 53 uncontrolled landfills (31 with closure and 22 with improvements to their management);
- Implementation of a programme for the rehabilitation of uncontrolled landfills.

An interministerial committee has been set up to facilitate and review the implementation of the PNDM, consisting of representatives of the Ministry of the Interior, the Ministry of Economy and Finance and the Ministry of Energy, Mines and the Environment.

During the implementation of the waste management reform based on the PNDM, sufficient attention was given to experts at the national and municipal levels, especially their ability to organize collection services in urban areas. Along with investments in waste management facilities, numerous capacity-building activities have taken place. This supports the implementation of Recommendation 8.1 of the first EPR, which urged the Ministry of the Interior, in collaboration with the then Ministry of Energy, Mines, Water and Environment, to continue strengthening capacity, especially in terms of human and financial resources, and developing expertise, especially by staff training, in waste management at the national and territorial levels. However, challenges still remain in almost all the municipalities, related to establishing at-source sorting of waste and increasing the rate of waste recovery and recycling. However, strengthening the expertise in waste management remains an objective in the waste management reform.

In the course of 2021, the Department of Sustainable Development is assessing the implementation of the PNDM.

National Programme for Waste Recovery

The PNVD is based on the SNRDV and provides an overview of the situation related to the selected waste streams, including the (estimated) amount of waste and recycling/recovery rates. The PNVD defines general objectives in line with the PNDM and related laws, and target rates for 2025 and 2030 (table 10.6). For MSW, the target is a more than threefold increase between 2015 and 2030, from 6 to 20 per cent, and for industrial waste, the target is a twofold increase, from 12 to 25 per cent. For waste-to-energy recovery and recovery of the organic materials from MSW, it set

ambitious targets of 10 and 20 per cent respectively, from the same base of 1 per cent. The PNVD also provides an overview of the recovery/recycling of selected waste streams. In most cases, the SEDD, alone or together with other ministries, signed partnership agreements with the industrial associations concerned, defining common activities and projects for improving the recycling/recovery of the given waste type(s).

Draft national programme for the management of medical and pharmaceutical waste

The report that underpins the preparation of the national programme for the management of medical and pharmaceutical waste (PNDMP) was completed in October 2016. There is no information about the official adoption of the programme, but the report still serves as the best presentation of the situation related to medical waste, with estimations of waste amounts by category and projections on the growth in waste generation by 2030. It also envisaged an action plan for the management of such waste by proposing horizontal (at the national level) and regional actions and subactions. Actions to be taken at the national level are:

- Development of awareness and training of staff in health-care establishments;
- Improvement of the quality of sorting within health-care establishments;
- Improvement of the collection and collection process within health-care establishments;
- Establishment or upgrading of intermediate and centralized storage sites;
- Treatment of medical waste of categories 2.a and 2.b.

Table 10.6: Waste recycling and recovery targets, percentage

	Status in 2015	Objectives	
		2025	2030
Recycling of MSW	6	15	20
Recycling of industrial waste	12	20	25
Energy recovery from waste	1	5	10
Recovery of organic material from MSW	1	10	20
Controlled disposal of construction and demolition waste	0	20	60
Plastics	25	50	70
Paper, cardboard	27	50	80
Metals	46	60	80
Lubricant oils	36	50	70
Electric and electronic equipment	12	20	40
Used batteries	30	50	80
Used tyres	42	60	80
Structuring end-of-life vehicles recovery channels	0	50	70

Source: National Programme for Waste Recovery.

The regional action plan sets the actions to be implemented by each region according to regional specificities and is mainly aimed at improving the treatment of category 1 medical waste, as follows:

- Optimization of the use of existing treatment capacities;
- Promotion of public–private partnerships;
- Improvement of the maintenance of the mill sterilizers (ECODAS T300).

There is no follow-up about implementation of the defined actions at the national and regional levels.

According to the draft PNDMP, medical waste (category 1 and 2) generation is expected to grow by between 36.5 per cent and 45 per cent between 2015 and 2030 and might reach 5,702 tons/year generated by hospitals. The projections for the whole health-care sector, including all types of institutions, indicate that medical waste generation might reach 11,080 tons/year. Even in that case, the current installed capacities at the national level, of 16,556 tons/year, will be sufficient for proper medical waste treatment in Morocco. Medical waste treatment is achieved by two means: in situ treatment at the level of health-care establishments and external treatment in a specialized unit. In both cases, after treatment, waste is transported and disposed of at a public landfill.

Recommendation 8.7 of the first EPR, urging the then Ministry of Health, in cooperation with the then Ministry of Energy, Mines, Water and Environment, relevant territorial authorities and other stakeholders, to develop a national strategy for the safe disposal of medical and pharmaceutical waste, is partially implemented. The proper treatment of medical waste is now fully established in Morocco, covering all the health-care institutions in the state and private sectors, with disposal capacities shared among the largest state hospitals and private operators. The institutional, legal and regulatory frameworks are also established and the capacities for safe disposal of medical waste are ensured, at least until 2030, but capacity-building of medical staff should be continued as an objective set by the PNDMP.

National Waste Reduction and Recovery Strategy

The Department of Sustainable Development initiated the preparation of the national SNRVD in 2018. In order to highlight the Strategy and its interventions, it appointed companies to elaborate preparatory studies for the future SNRDV. The general objective was to prepare the SNRVD within a framework of consultation with all stakeholders, and thus to make

progress in the application of a hierarchy of waste treatment methods to accelerate the transition towards a circular economy in Morocco.

As part of this process, two studies have been prepared. The objective of the first one is to understand the current state of waste deposits by region, assess the reduction and recovery potential of wastes and identify waste management governance (legal, institutional and financial framework), and draw up the vision and main strategic axes of the future SNRVD, as well as accompanying actions. The second study covers the following waste streams: solid household and similar waste, waste from industrial activities (all production and processing activities), including construction and public works, D3E, used tyres, vehicles end of life, used batteries, plastic waste and wastepaper and cardboard and used lubricating oils. Agricultural waste is not considered due to lack of data.

The second study covers the following waste streams: MSW and similar waste; waste from economic (i.e., production and processing) activities, including construction and public works; end-of-life products, mainly corresponding to WEEE, non-reusable used tyres, ELVs and used batteries; packaging waste; and used lubricating oils. Agricultural waste is not taken into account due to the lack of data.

Institutional framework

The Ministry of Energy Transition and Sustainable Development is responsible for environmental policy at the national level through its Department of Sustainable Development. It is responsible for developing and implementing the policy related to waste management and implementing the PNDM. The Environmental Police is a unit of the Ministry and by law is entitled to perform waste-related inspections (chapters 1 and 2).

The Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests is responsible for the management of agricultural waste and also actively takes part in the organization of the plastic bag collection campaign that began in 2016.

The Ministry of Industry and Trade is involved in the partnership for establishing the extended producer responsibility value chain for used batteries, used lubricant oils and ELVs.

The Ministry of Equipment and Water is involved in the partnership for establishing the extended producer responsibility value chain for ELVs.

The Ministry of the Interior is responsible for the municipalities and thus for ensuring the framework and financing for proper MSW management at the local level. The Programme Management Unit for the PNDM was established within this Ministry.

The Ministry of Economy and Finance is part of the interministerial committee for the PNDM. It is also responsible for issues related to taxation and thus has a role in regulating and implementing the ecotax scheme. It also has a role in supporting the establishment of recovery value chains for selected waste streams, where the involvement of the business sector is important for achieving progress.

The Ministry of Health and Social Welfare is responsible, through its Department of Hospitals and Mobile Care, for regularly monitoring the technical and administrative functions of hospitals, which also covers medical waste management.

AMSSNuR is responsible for the establishment of the national policy, strategy and regulatory framework and specific regulations dealing with radioactive waste management, including controlling and supervising radioactive waste management activities in the country. It was created in 2014 as a new and independent regulatory body responsible to the Head of Government by the adoption of Law No. 142-12. It took over the regulatory responsibilities and attributions of the former regulatory bodies (National Centre for Radiation Protection (CNRP) and the then Ministry of Energy, Mines, Water and Environment).

CNESTEN is responsible for centralized radioactive waste management at the national level. CNESTEN operates a radioactive waste facility dedicated to receiving, sorting, handling, treating, conditioning and storing radioactive waste generated in industries, hospitals, universities, research organizations and the Centre of Nuclear Studies of Mâamora. An agent of the radiation protection unit in CNESTEN is appointed in each installation in which radioactive material is used, to supervise the fulfilment of provisions for radiation protection and safety requirements.

Licence holders of facilities generating radioactive waste and practitioners licensed to use radiation sources are required to perform their activities in compliance with Law No. 142-12. Moroccan regulations also stipulate that, besides the safety of the installation and workers, the licence holder is responsible for waste until it is collected by CNESTEN or discharged into the environment with authorization from AMSSNuR. Characterization, segregation and storage of waste according to safety

and radiation protection requirements defined by AMSSNuR and waste acceptance criteria are defined by CNESTEN.

Regulatory, economic, fiscal and information measures

Taxes and fees

There is no landfill tax.

Ecotax on used lubricant oils

To further increase the collection and recycling rate of used lubricant oils, after consultations with the key sectoral stakeholders, the Government decided to introduce the ecotax for lubricant oils in 2015. However, after the partnership agreement was signed in October 2015 by the SEDD, the then Ministry of Industry and Investment, of Commerce and the Digital Economy, and the Moroccan Petroleum Group, a sectoral association, further consultations resulted in postponement of the introduction of such an ecotax. In May 2018, the Government and the Moroccan Petroleum Group discussed the draft text of a governmental order to regulate the market and treatment of used lubricant oils.

Ecotax on plastic

An eco-tax was instituted by the 2013 Finance Law, on the sale, exit of factory and imports of plastic materials and works in these materials falling under chapter 39 of the Harmonized System, the rate of which is 1.5 per cent ad valorem. In 2016, this rate fell to 1 per cent.

Ecotax on tyres

To support the development of the tyre recycling sector, an eco-tax was proposed but was not adopted. Through this ecotax project, importers of tyres and vehicles should pay 6 dirhams per tyre weighing less than 15 kg and 19 dirhams per tyre weighing between 15 kg and 70 kg. The ecotax was expected to be paid three months to the company managing the treatment of this waste stream.

Awareness and education and training for sound waste management

The improvement of MSW management was clearly one of the environmental priorities of the Government in the past decade. It is reflected not only in continuous investments in the infrastructure and collection services but also in the efforts put into the nationwide awareness-raising campaigns by the Government. At

the beginning of the 2010s, the presence of waste in the natural environment, especially plastic waste in the form of plastic bags, had already reached critical levels. This problem has escalated and was threatening not only to have widespread harmful effects on human health and the environment but also to seriously hinder the operation and future development of the tourism sector due to the presence of such waste in the coastal areas as well.

Both the Government and the public at large have recognized the seriousness of the situation. Subsequent measures for improving waste management were followed by continuous awareness-raising projects supported by the Government and foreign donors. The state actors were the SEDD and the Mohammed VI Foundation for the Protection of the Environment, which is the biggest single Moroccan donor and initiator of several campaigns, mostly focusing on the coastal area through its flagship Clean Beaches Programme (chapter 12) and other activities aimed at sustainable tourism, and on historical parks and gardens. Projects in recent years focused directly on waste management, especially on the sorting of MSW at source, with the double objective of raising public awareness and piloting actions from which conclusions can be drawn to improve waste collection.

The Department of Culture, through the INBA, organized workshops on:

- Installations of contemporary creative works such as sculptures made from recycled products or their components;
- The production of design products such as candelabras and decorative objects by INBA students reusing plastic waste;
- The making of parchment and artistic works using a paper-crushing machine.

10.5 Assessment, conclusions and recommendations

Assessment

The improvement of waste management services in Morocco has been continuous since the adoption of the PNDM in 2007, which, over the last decade, has provided, and still provides, useful guidelines for the country's policymakers and officials, as well as foreign donors. In parallel with the establishment of the legal framework for various subsectors of waste management, a massive investment cycle is being implemented in the country in order to establish the basic infrastructure and preconditions for a

functioning MSW management system in the form of landfills and recovery/recycling centres.

Faced with widespread waste pollution leaking into the natural environment, caused by improperly and often illegally dumped waste, which, at some point, started to threaten both the living conditions in human settlements and two of the vital economic sectors of the country, tourism and fishing, both the public at large and high-level officials realized that waste management performance should be significantly improved. The objectives and actions defined by the PNDM were implemented step by step and with full support and commitment from top officials, which was one of the keys to the success story of the Moroccan MSW system over the past decade.

The biggest achievement is that the target collection rate of MSW set by the PNDM has been outperformed and reached 96 per cent in urban areas. Also, the 63 per cent landfilling rate can be seen as a significant result, while the closure and rehabilitation of the identified uncontrolled dumpsites is somewhat lagging behind the targets (about a quarter have been rehabilitated). Despite the fact that numerous landfill and recovery centres have begun operations and extended producer responsibility initiatives have been undertaken in recent years, waste recovery, and particularly the recycling rate, remains at a low level; furthermore, the contracting and tariff-setting of waste collection and treatment services are not assessed and aligned with the needs of the market.

The management of medical waste is another area where progress has been achieved, such that the whole health-care sector is now covered by comprehensive waste treatment services with adequate capacity that is estimated to be sufficient until at least until 2030.

While the legal framework and the MSW and medical waste treatment infrastructure has improved, less attention was given to the development of the regulatory and monitoring framework and the treatment of other waste types (e.g., industrial, construction and demolition and hazardous waste). Also, one of the preconditions for sound mid- and long-term planning and decision-making, and also for the evaluation of implemented measures, reliable data on waste generation are still not available in Morocco, and neither is there a proper statistical system for waste-related data.

The lack of data hinders the assessment of the achievement of SDG targets 11.6, 12.5 and 12.4 by Morocco. Morocco's level of implementation of the recommendations on waste management of the first EPR is mixed and some remain valid.

*Conclusions and recommendations*Waste management data collection and quality

Waste-related data are predominantly based on estimations, which are not even updated regularly but usually done for the purpose of studies underlining strategic documents. The lack of data based on actual measurements or sampling and reporting by economic subjects in an issue that is hindering evidence-based decision-making and evaluation of progress across the whole spectrum of the different waste subsectors and waste streams.

Recommendation 10.1:

The Ministry of the Interior, in cooperation with the Department of Sustainable Development, should set up a system to collect data on waste management and the HCP should ensure follow-up on relevant indicators.

Extended producer responsibility schemes

Officials and experts in Morocco are well aware that the key to increasing waste recovery and recycling is the introduction of obligatory extended producer responsibility schemes for those waste streams that are most polluting and in which recovery is economically most feasible. However, partnership initiatives between the Government and sectoral associations working in the field that generate or manage most of the related waste have not allowed to adopt a legislation on extended producer responsibility and its implementation.

Recommendation 10.2:

The Government should accelerate the revision of Law on Waste Management and Disposal, including to integrate extended producer/importer responsibility in order to involve them more in the efficient management of waste.

Collection rate of MSW

The MSW collection rate has increased, especially in the urban areas, in the past decade, as has waste disposal on controlled landfills. However, this was not followed by an increased recycling rate due to the fact that waste collecting and treatment companies are neither obligated nor motivated to introduce separate waste collection. The tariff-setting and pricing of waste management services have not been redesigned and regulated to allow the maintenance of a sound

MSW management system with separate collection that will be sustainable in the long term.

Recommendation 10.3:

The Government should:

- (a) *Promote selective sorting and separate collection of MSW at the source in urban areas;*
- (b) *Develop and expand the treatment of waste, including composting and energy recovery;*
- (c) *Gradually introduce obligatory waste recovery and recycling rates for companies dealing with waste treatment;*
- (d) *Establish a fee for landfilling to cover the post-operational monitoring and rehabilitation of the landfills.*

Waste management services

MSW, medical waste and radioactive waste management services are performing relatively well in Morocco. However, there is not enough attention given to the management of the other waste types, which can also have serious adverse effects on the environment if not treated properly.

Recommendation 10.4:

The Government should implement the conclusions and recommendations of studies carried out on waste recovery streams, especially those that have serious adverse effects on the environment if not treated properly.

Effects of dumpsites and illegal waste disposal

The unpleasant and negative effects of dumpsites and illegal waste disposal are well known to both the public and experts, due to media coverage. However, the real features and harmful effects of improper disposal of waste are not measured or sampled and researched by any public institution in Morocco. Also, there is currently insufficient operational compliance with national regulations by newly built landfills and inadequate monitoring thereof.

Recommendation 10.5:

The Department of Sustainable Development should strengthen the environmental monitoring and inspection performed in and around landfills or rehabilitated dumpsites and accelerate the closure and rehabilitation of dumpsites.

Chapter 11

BIODIVERSITY AND PROTECTED AREAS

11.1 Trends in species and ecosystems

Species diversity

Morocco is an important country for global biodiversity and an important part of one of the world's 35 designated Biodiversity Hotspots, the Mediterranean Basin. The country has a diversity of ecosystems, including climatic and physiographic regions ranging from Mediterranean to arid climates and from the Atlantic and Mediterranean coasts to mountains reaching over 4,000 m above sea level. These ecosystems are home to more than 25,000 animal species and 8,371 plant species, according to figures presented in the NBSAP, with a particularly high rate of endemism (more than 20 per cent of vascular plants and 11 per cent of fauna). In addition, Morocco's seascapes harbour a great diversity of marine species (7,830 species), of which several constitute important fisheries.

Threatened species

Data on species diversity remain fragmented but point to a general trend of biodiversity loss. In 1998, the Department of Sustainable Development published a national assessment of Moroccan biodiversity funded by UNEP. Partially updated in 2013, it still provides the basis for most policy decisions. Several recent initiatives have updated this knowledge for mammals,²⁷⁶ birds,²⁷⁷ amphibians and reptiles,²⁷⁸ flora (an initiative of the Scientific Institute of Rabat, 2016–2018) and marine species (conducted by the INRH, 2015–2017). The National Assessment of Biodiversity and Ecosystem Services being prepared in 2020–2021 with funding from GIZ includes an update to the national species list.

The IUCN Red List of Threatened Species provides the most authoritative assessment of the conservation status of species. In the absence of a national Red List, an assessment of the global status of 2,675 species found in Morocco shows a generally negative trend in population sizes and areas of occurrence (table 11.1). The worst-affected species appear to be those that are

already known to have a very poor conservation status. Of 39 species listed as being Critically Endangered (CR), 69 per cent have a decreasing population. The corresponding proportion for Endangered (EN) and Vulnerable (VU) species is 67 per cent (62 of 93 species) and 72 per cent (93 of 130 species), respectively. Among species with a decreasing population trend are several charismatic mammal species, such as the addax (*Addax nasomaculatus*), the Barbary macaque (*Macaca sylvanus*) and the leopard (*Panthera pardus*).

This is confirmed by the IUCN Red List Index (RLI) of species survival, which points to an increasingly threatened Moroccan fauna. The RLI is calculated based on changes over time in the global conservation status of a set of species found in Morocco (125 mammals, 328 birds, 11 amphibians and 4 coral species), as determined using the criteria and methods of the IUCN Red List. As demonstrated in the 2020 VNR implementation of the SDGs, a number of actions have been taken to now reduce the degradation of natural habitats, halt the loss of biodiversity and protect and prevent the extinction of threatened species, notably in forest areas but also in freshwater and mountain ecosystems (SDG target 15.5). However, the impact has been rather limited.

In spite of these challenges, Morocco has played an important role in the conservation of other emblematic species, such as the Mediterranean monk seal (*Monachus monachus*), which has seen its status improve from CR to EN, and Cuvier's gazelle (*Gazella cuvieri*), which has improved from EN to VU. Prospects for less threatened species appear to be more promising, with 36 per cent of species listed as of Least Concern (LC) (741 of 2,051 species) recorded as having a stable population and 6 per cent having an increasing population (116 species).

Important knowledge gaps remain, however, and the population trend of 1,291 of 2,675 species recorded by IUCN (48 per cent) is unknown, including that of 31 per cent of CR and 29 per cent of EN species. Twenty-

²⁷⁶ Aulagnier S., Cuzin F., and Thévenot M. 2017. Mammifères sauvages du Maroc : Peuplement, Répartition, Ecologie. Paris : Société Française pour l'Etude et la Protection des Mammifères.

²⁷⁷ El Agbani M.A. and all, Les Oiseaux d'intérêt patrimonial au Maroc, 2011, Publications du GREPOM, Rabat. 1.

²⁷⁸ Martínez Del Marmol et al., 2019, Amphibians and Reptiles of Morocco.

four endemic species are assessed as Data Deficient (DD), among 222 DD species in Morocco.

Endemic species

Within the Mediterranean Biodiversity Hotspot, Morocco has the second highest endemism rate, in part because of its isolated biogeographical location (bounded by the Mediterranean Sea to the north, the

Atlantic Ocean to the west and the Sahara to the south) and also because of its four mountain ranges (the Rif, Middle Atlas, High Atlas and Anti-Atlas), which generate “islands” of high-altitude habitat. More than 20 per cent of its vascular plants and 11 per cent of its fauna are endemic to Morocco. And within fauna, amphibians, reptiles, Continental aquatic fauna and mammals have the highest rate of endemism (table 11.2).

Table 11.1: Status of IUCN Red List flora and fauna species occurring in Morocco

Status	Species with Decreasing trend within assessed status		Species with Increasing trend within assessed status		Species with Stable trend within assessed status		Species with Unknown trend within assessed status		No trend indication given in IUCN Red List		Species by status	
	N	%	N	%	N	%	N	%	N	%	N	% of total IUCN species
Extinct (EX)	x	x	x	x	x	x	x	x	x	x	2	0
Extinct in the Wild (EW)	x	x	x	x	x	x	x	x	x	x	1	0
Critically Endangered (CR)	27	69	0	0	0	0	12	31	0	0	39	1
Endangered (EN)	62	67	3	3	1	1	27	29	0	0	93	3
Vulnerable (VU)	93	72	2	2	3	2	24	18	8	6	130	5
Near Threatened (NT)	84	61	0	0	8	6	43	31	2	1	137	5
Least Concern (LC)	212	10	116	6	741	36	981	48	1	0	2 051	77
Data Deficient (DD)	10	5	0	0	6	3	204	92	2	1	222	8

Source: Compiled from data available from the IUCN Red List of Threatened Species (as at December 2020).

Photo 11.1: Dorcas gazelle (*Gazella dorcas*), also known as the ariel gazelle



Photo credit: Department of Sustainable Development

Table 11.2: Endemic fauna, number

Taxa group	Total species	Endemic species	Percentage of endemism	Rare or endangered species
Terrestrial invertebrate	15 293	2 280	1.5	69
Continental aquatic fauna	1 575	136	8.6	126
Freshwater fish	7 136	236	3.3	271
Amphibians	11	2	18.2	3
Reptiles	92	25	27.2	31
Birds	449	12	2.7	98
Mammals	105	22	20.9	16

Source: www.archives.biodiv.be/maroc/biodiversity/faun_flor/fauna.

The highest rates of endemism within the country are in the High Atlas Mountains, with about 163 plant species endemic to Morocco, of which 136 are in Toubkal National Park (380 km²). This means that 4 per cent of Morocco's flora is found nowhere else. Overall, the High Atlas Mountains harbour 30.5 per cent of Morocco's flora.

Invasive alien species

As at December 2020, the Global Invasive Species Database (GISD) listed 34 invasive alien species (IAS) (table 11.3) and an additional four species of unspecified status in Morocco. This may be a conservative assessment as other sources indicate other IAS not listed in the GISD. A 2018 study on invasive plants threatening agriculture and ecosystems²⁷⁹ identified 29 IAS plants in Morocco, including seven of the eight species determined as highly invasive that are not recorded in the GISD. These data are used by the Sahara and Sahel Observatory (OSS), an intergovernmental organization.

Table 11.3: Invasive alien species in Morocco, number

Biotic component	
Trees	4
Herbs/shrubs	5
Sedges	1
Aquatic plants	1
Grasses	2
Algae	1
Birds	2
Molluscs	1
Fish	16
Insects	1
Total	34

Source: Compiled from data available from the Global Invasive Species Database, December 2020.

The importance of controlling and combating IAS is identified in objective B5 of Morocco's NBSAP, which is consistent with SDG target 15.8.

According to the country's Sixth National Report on Biodiversity to the Convention on Biological Diversity (CBD), published in 2019 and still current as at April 2021, even if the ONSSA is in charge of controls on plant and animal imports, to minimize the introduction of IAS, objective B5 is not yet implemented. No specific programme (or regulatory text) to combat the impact of invasive species (both marine and terrestrial) has been developed to date. However, scientific studies carried out by INRA and the Hassan II Agronomic and Veterinary Institute aim to establish baseline data and a list of species. The INRH also runs a surveillance network and inventory of exotic species along the Moroccan seashore. Finally, Law No. 76-17 on Plant Protection, referring to the control and monitoring of harmful species, came into force in July 2021. The implementation of this objective would support the realization of SDG target 15.8.

Genetic resources

In Morocco, a large rural population still regularly uses wild species, with the associated traditional knowledge. However, relevant data are not collected.

Trends in ecosystems

The Fourth National SOER in Morocco identified the following ecosystem categories: mountains, marine and coastal, desertic and arid areas including oases, inland water ecosystems including wetlands and continental fresh water, forest and steppe.

²⁷⁹ Ben Ghabrit S., Bouhache M., Birouk A. & Bon M.-C. 2018. Quand les plantes envahissantes menacent l'agriculture et les écosystèmes. Onzième Congrès de l'Association Marocaine de Protection des plantes. 26-27 Mars 2018, Rabat, Maroc. Available from: www.researchgate.net/profile/Salmane_Ben-Ghabrit/publication/333472632_Quand_les_plantes_exotiques_envahissantes_menacent_l'agriculture_et_les_ecosystemes/links/5cef3309299b1fb18494ddd/Quand-les-plantes-exotiques-envahissantes-menacent-l'agriculture-et-les-ecosystemes.pdf.

Mountains

Together, the Rif, High Atlas, Middle Atlas and Anti-Atlas Mountains harbour 80 per cent of the country's endemic species, as well as important and diversified natural resources (70 per cent of surface waters, 62 per cent of forests, 70 per cent of national wood production and 35 per cent of the productive agricultural land in Morocco).

In 2015, as part of a national programme on the development of mountain areas, 29 per cent of Morocco's mountains were identified as priority areas for protection, based on: (i) the risk of environmental deterioration; and (ii) the importance of the natural biological resources to protect. At the same time, 64 per cent of mountain areas were described as being at an advanced level of deterioration. Only 7 per cent of the area was classified as having low to medium deterioration.

Marine and coastal zones

The Moroccan coast hosts various ecosystems, including forests, wetlands, steppes, dunes, and coastal lagoons and estuaries. These ecosystems are particularly vulnerable. These are also critical ecosystems for migratory shorebirds, which use them as stopovers and winter feeding or breeding sites. Almost all lagoons and estuaries are polluted by fertilizers and pesticides. More generally, 51 per cent of the country's total population, 68 per cent of its industry and 50 per cent of its tourism infrastructure are on the coast or littoral, which explains why coastal ecosystems are particularly threatened.

An artificial reef modules immersion project was carried out in the Alboran and Mogador marine protected areas (MPAs) in 2017 for the rehabilitation of resources and their habitats. Other artificial reefs have been submerged in Agadir and Martil. Other sites contribute to the MPA network, such as certain Ramsar sites (e.g., Cap des Trois Fourches, Bas Tahaddart and Moulouya) and national parks (e.g., Khenifiss and Al Hoceima).

Desert and oases

Desert ecosystems and pre-desertic areas (pebbly and sandy surfaces), with scant rainfall, dominate the south and east of Morocco. They are not devoid of life and harbour 750 different plant species (60 of which are endemic to Morocco), 650 invertebrates (most of them endemic to Morocco), more than 250 species of birds and at least 40 of the most endangered mammal species in Morocco.

Within the arid zones, there are human-made oases and cultivated lands on which the presence of date palms is an indicator of good health. Oases provide protection against desertification, in addition to economic and social benefits. Oases are maintained through traditional management of water resources in *khattara* irrigation systems, in which underground pipes carry water from rivers (*oueds*) or groundwater sources downstream to the palm groves. These systems are highly vulnerable to fluctuations in the water table due to excessive use and climate change, which makes rural populations dependent on oases particularly vulnerable.

Freshwater and wetlands

In 2015, wetlands in Morocco covered around 400,000 ha, on 300 sites, including approximately 170 artificial reservoirs (120,000 ha). However, 50 per cent of Morocco's wetlands have disappeared since the beginning of the 20th century. The remaining wetlands are under intense human pressure and particularly vulnerable to climate change.

Not only are these ecosystems essential to the water cycle and the management of floods and droughts but they also play an essential role for many wild species, including migratory waterbirds, 19 freshwater fish species endemic to Morocco, and the critically endangered freshwater mussel (*Margaritifera marocana*). Some aquatic systems in the arid zones harbour very restricted range endemics that are relics of wetter climates and are heavily dependent on these ecosystems (e.g., *Tilapia zillii*).

Forests

Morocco's official forest area covers 9,631,896 ha (13.5 per cent of its land area), but this includes vast areas of alpha steppe (37 per cent of the total forest area). This steppe is actually an open, semi-arid ecosystem dominated by *Stipa tenacissima*, found across arid plains and high plateaus of oriental Morocco.

In 2020, forests cover 6,212,056 ha, including natural forests dominated by deciduous (34 per cent) or coniferous (14 per cent) trees, and artificial plantations (8 per cent). The general trend is a loss of forest areas despite a reforestation programme through which 1,399,000 ha have been afforested since 1950, and the widespread recognition of the social and economic importance of forests. The value of the ecosystem services provided by forest ecosystems in Morocco has been estimated to reach at least 17 billion dirhams/year, with key beneficiaries in the medicinal

and aromatic plants (MAPs) sector, honey production, livestock grazing, timber and tourism.

According to the Department of Water and Forests, 3.2 million ha of natural forest have a forestry management plan (two thirds of natural forest, excluding artificial forest, steppes and shrubland). Efforts towards third-party certification were made through the Morocco Forest Policy Support Programme (2013–2018). A pre-audit was carried out on 13 forests, covering 276,286 ha, to identify gaps to certification by the Forest Stewardship Council (FSC). Thus, Morocco has strongly embraced SDG target 15.2. However, the other part of the SDG target (Halt deforestation, restore degraded forests and substantially increase afforestation and reforestation) is not sufficiently strengthened.

A Red List of Ecosystems assessment is under way and is expected to provide a useful baseline to measure progress on conserving and restoring forest landscapes. Forests are still threatened by unsustainable collection of non-timber products, overgrazing (almost all forests are overgrazed), clearing for agriculture, fire and urbanization.

11.2 Pressures on species and ecosystems

In 2019, Morocco's population was approximately 36 million, a threefold increase since 1960. The HCP, in its 2014 demographic study, projected a population of around 43.5 million in 2050, with a negative growth rate. This increase in the Moroccan population has brought, and will unavoidably continue to bring, an increased human impact on ecosystems, biodiversity and natural resources.

The Global Footprint Network (GFN) calculated Morocco's ecological footprint²⁸⁰ in 2017 to be 1.77, while its biocapacity²⁸¹ was only 0.73, indicating an ecological deficit of 1.04. This gap has steadily increased since 1974. The GFN provides a preliminary global assessment of deficit sources, which are similar in Morocco as in the rest of the world: carbon comes first, then agriculture and forest products (wood or non-wood).

Data from the IUCN Red List assessment provide indications of the main threats affecting species, recognizing that most species are affected by multiple threats. Table 11.4 provides insights on the threats that affect the largest number of species among 262 threatened species (40 CR and 226 EN and VU) for which this assessment is available.

Urban expansion

The proportion of Morocco's population living in cities has reached 60 per cent, with much higher rates along the Atlantic and Mediterranean coasts and in their immediate hinterlands. Over half of Morocco's population and many tourist activities and development are concentrated in the country's largest cities, with the Casablanca-Rabat conurbation concentrating around 7 million people. The expansion of urban areas converts agricultural land and natural ecosystems, and contributes to water, air and soil pollution from wastewater, automobile traffic and industry.

According to the IUCN Red List data, urbanization affects 27 per cent of Moroccan threatened species. The majority of species covered under urbanization overlap with threats related to "tourism and leisure". If these threats are added to urbanization, this rate reaches 33 per cent (89 species).

Agriculture

Intensive and unreasonable agricultural practices are a major threat to biodiversity, notably through the conversion of natural and semi-natural habitats, water use, soil erosion and non-point-source pollution of waters and soils by fertilizer and pesticide inputs. According to IUCN Red List data, agriculture affects 31 per cent of threatened species and is considered as their third-ranking key threat. Since independence, Morocco's agricultural policy has been centred on intensification and export markets. The Green Morocco Plan 2008–2019 (PMV), succeeded by Generation Green 2020–2030, aimed to double agricultural GDP in order to reach between 200 billion and 250 billion dirhams by 2030.

²⁸⁰ "A measure of how much area of biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management practices." (GFN).

²⁸¹ "The capacity of ecosystems to regenerate what people demand from those surfaces." (GFN).

Table 11.4: Selected major threats affecting Moroccan Critically Endangered, Endangered and Vulnerable species listed in the IUCN Red List of Threatened Species

Threat	Species	Threatened species affected (%)
Livestock farming and grazing pressure	86	33
Fishing	85	32
Agriculture	81	31
Tourism and leisure	75	29
Urbanization	70	27
Water pollution	63	24
Droughts	53	20
Abstraction of water (groundwater, surface water, dams)	51	19
Forestry	47	18
Transport sector	45	17
Invasive competing species	42	16
Hunting	40	15
Habitat shifting and alteration due to climate change	27	10
Gathering terrestrial plants	24	9
Fire	23	9
Commercial and industrial areas development	20	8
Energy production and mining	19	7
Soil contamination and alteration	19	7
Temperature extremes	16	6
Storms and flooding	9	3
Garbage and solid waste	8	3
Excess energy (light, thermal and noise pollution)	8	3
Aquaculture	4	2
Acid rain	3	1

Source: Compiled from data available from the IUCN Red List of Threatened Species, December 2020.

No data are available on natural land taken for agriculture, but forests have been shown to be particularly vulnerable to the extension of agricultural lands. The most severe impacts from agriculture relate to water: non-point-source pollution of aquatic ecosystems with fertilizer (eutrophication) and pesticides, and groundwater depletion for irrigation purposes, which affects river flows and concentrates pollutants. As a result, most of Morocco's lakes (artificial or natural) are affected by poor water quality. It is estimated that 50 per cent of estuaries have changed their hydro-sedimentary dynamics, and that 30 per cent of wetlands are polluted to very different degrees. Measures for improving water quality and achieving SDG target 6.6 are not sufficient, because there are no effective controls on nutrient and pesticide inputs and no targeted restoration efforts put in place yet.

Livestock and overgrazing

Grazing lands cover 90 per cent of Morocco's land area, including those used by nomadic flocks, and grazing is an important threat that affects 33 per cent of Morocco's threatened species, according to IUCN Red List data. Overgrazing leads to a degradation of sylvo-pastoral ecosystems and their biodiversity. This also induces soil erosion, the degradation of water resources and a loss of biodiversity and contributes to desertification. Livestock also contributes to water pollution, wherever animals are concentrated.

Fishing

Fisheries constitute an important economic sector in Morocco, but overfishing has led to a decrease in stocks, with pressure on several valuable species and 32 per cent of the country's threatened species. Increased research efforts for better monitoring of the state of fisheries have shown that the main fish stocks all call for vigilance as to the level of fishing pressure. As a result, in 2010, the Department of Fisheries Resources of the INRH prepared fisheries management plans for 18 species. However, despite these plans, several fisheries remain overfished:

- Sardines in the Mediterranean (catches exceeding the optimum catch by 89 per cent in 2013);
- Swordfish (fishing mortality rate is almost twice as high as the optimum level, while the biomass of the stock in 2013 was only 27 per cent of the optimum level);
- Cephalopods (biomass in 2017 was only 52 per cent of the target biomass level);
- White fish, in particular white hake (catch rate in 2013 was 10 per cent above sustainable catch rate).

Illegal hunting and wildlife trafficking

Legal hunting is regulated with bag limits and seasonal restrictions or bans on designated species. Illegal hunting, however, remains a problem. Species such as

the Barbary macaque (*Macaca sylvanus*) and Mediterranean chameleon (*Chamaeleo chamaeleon*) are targeted by the pet trade, while Cuvier's gazelle (*Gazella cuvieri*) is hunted for sport and food. Data on poaching and illegal trafficking of wildlife are sparse, but Morocco has undertaken efforts to achieve SDG target 15.7. The country established a monitoring mechanism for wildlife with 19 monitoring and control units and strengthened the legal framework through the 2011 Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade, with several species added to Convention on International Trade of Endangered Species (CITES) appendices. Surveillance and enforcement matter, as the surge in poaching during the COVID-19 pandemic has shown.

Logging and harvesting of non-timber forest products

Forest cover decreases by 31,000 ha per year, mainly through fire and clearing for firewood and/or timber, and the extension of cereal crops and grazing land. In addition to the loss of forest biodiversity, decreased tree cover exacerbates soil erosion (locally) and desertification (at larger spatial scales). However, forest cover area data should be considered with caution. It is laborious to find accurate data and, based on the National Report on Biodiversity to the CBD, this area has not changed since 1998. The area of forest burned has decreased over past decades, from 3,700 ha/year between 1997 and 2006 to 2,580 ha/year between 2007 and 2016, as a result of more numerous (415 to 455) but smaller (8 to 6 ha/fire on average) fires.²⁸²

The harvesting of non-timber forest products is another impact on forest ecosystems, with overharvesting of several MAPs. Morocco is home to more than 400 MAP species, such as oregano, rosemary and thyme. Balancing people's traditional natural resource use and profitable value chains with conservation goals remains challenging. In response, several projects and actions have been implemented since 2014, including the creation of the National Agency for Medicinal and Aromatic Plants²⁸³ and the project to integrate biodiversity into MAPs value chains,²⁸⁴ funded by GIZ, UNDP and GEF in collaboration with the Department of Water and Forests.

Fuel wood harvesting is another important threat to Moroccan forests, especially in mountain areas. Almost 10 million m³ of fuel wood is collected annually from forests, while their sustainable production capacity has been estimated at 3.3 m³/year. This overharvesting is particularly acute in the High Oriental Atlas at Ifrane and Khenifra, where many rural communities are very dependent on forest resources and have access to forests of high ecological value.²⁸⁵

The loss of forests is a key step in the desertification process through which large areas lose their topsoil and their biological potential and resilience. Wind and water erosion, and the resulting silting of waterways, are also manifestations of desertification. This is a particular concern in the drier east and the south of the country. In 2013, the Department of Water and Forests published an updated PANLCD, which provides sensitivity maps and site-specific responses. This analysis shows that 18 per cent of the country's area has medium desertification sensitivity, while 9 per cent has high desertification sensitivity. Nearly half the country (47 per cent) corresponds to the unclassified hyper-arid Saharan zone. Almost 87 per cent of the pre-Saharan area has a high level of sensitivity, as do the sub-Massa and Arganeraie areas. Desertification affects 40 per cent of the eastern plains and plateaus. Even the Rif and the mountain ranges of the High Atlas show a high sensitivity to desertification due to the importance of erosion and degradation of vegetation cover in the desertification process.

Transport infrastructure, energy projects and mining

In addition to land take, these three sectors generate specific threats to biodiversity, such as soil and water pollution and habitat fragmentation.

Moroccan mining is diversified (chapter 14) and its 259 mines (of which 63 are active) generate pollution of surface water and groundwater through mine-water release into the environment. In the case of open-pit mines, leaching and tailing run-off from waste directly or indirectly affect surface water and groundwater resources. Moreover, 68 per cent of the mines are located in the Tensift, Moulouya and Drâa-Oued Noun watersheds, which are particularly affected.

²⁸² www.eauxetforets.gov.ma.

²⁸³ www.anpma.ma/.

²⁸⁴ www.fellah-trade.com/fr/actualites-maroc/article?id=3912.

²⁸⁵ Faoudi H. 2013. L'exploitation du bois-énergie dans les arganeraies : entre soutenabilité et dégradation (région des Haha, Haut-Atlas Occidental, Maroc). Les Cahiers d'Outre-Mer. Revue de géographie de Bordeaux. Available from <https://journals.openedition.org/com/6832>.

Transport infrastructure, in particular, railways and roads, creates barriers to wildlife movement and fragments habitats. According to IUCN Red List data, this sector is a threat for 17 per cent of the threatened species of Morocco.

Wind energy projects and associated power lines also fragment habitats by creating barriers for birds and bats. Migratory birds are exposed to a growing number of wind power plants from the strait of Gibraltar southwards. In spite of the 2003 Law No. 12-03 on Environmental Assessment that made EIA mandatory for such projects, mitigation, monitoring and enforcement standards remain low.

11.3 Climate change

Impact on biodiversity and ecosystems

The impacts of climate change on biodiversity and ecosystems include those due to accelerated desertification, reductions in water availability and the amplification of invasive alien species. Furthermore, the climate extremes and changing climate averages lead to local extinctions, changes in demographic success and shifts in the spatial and temporal occurrence of many species. Pressures on mountain ecosystems are growing, especially on forests. These areas are highly sensitive to climate change.

According to recent research by the Max-Planck Institute,²⁸⁶ the Afro-Arab region's biodiversity is highly vulnerable to climate change. One statistical model predicts that 17 per cent of the region's endemic mammals could disappear before 2050 under current climate change scenarios. A certain number of endemic species will thus move from the threat category of Least Concern (LC) to Critically Endangered (CR) or Extinct (EX) over the coming decades.

According to INRA, Climate change effects on rainfall and average temperatures are already affecting Morocco, worsening water stress. In oasis areas, water resources will not be able to meet the needs of traditional agriculture systems, which may increase pressures in the neighbouring arid lands, leading to accelerated desertification. According to IUCN Red List data, droughts are already threatening 20 per cent of Morocco's threatened species. Protected areas and forests, particularly in mountain areas, will also be negatively affected, in spite of their role in climate change mitigation and adaptation through the carbon and water cycles. Overexploitation of their natural

resources (logging, harvesting, grazing) makes forests more prone to climate change impacts, as noted in the PCN.

Sea-level rise and the increased frequency of extreme events are expected to increase coastal erosion, which may affect coastal ecosystems and biodiversity, including the loss of coastal protected areas and critical estuarine and lagoon habitats. The most severe impacts will affect the least mobile species and it is feared that monk seals, which breed in caves on the Cap Blanc, may be particularly vulnerable. At sea, changes in the ocean system (e.g., temperature, acidification, currents) could lead to major changes in fisheries as fish movement patterns respond to new spatio-temporal distribution in resources or fail to find suitable conditions. Overfishing may decrease this response capacity.

Adaptation measures

The PCN approaches climate change adaptation for biodiversity through seven measures aimed at strengthening the resilience of sensitive ecosystems and biodiversity:

- Strengthening policies for the conservation and rehabilitation of biodiversity and wetlands;
- Strengthening forest ecosystem adaptation and sustainable management;
- Strengthening coastal resilience to address climate change;
- Preserving oases and desert areas;
- Strengthening the resilience of mountain areas;
- Improving sustainable management of natural ecosystems;
- Improving knowledge of soil pressures.

These measures cover the main climate-related biodiversity issues, but their operationalization remains to be defined and implemented, which will require a cross-sectoral approach. The PCN also recommends monitoring and enforcement tools to ensure effective reporting, while ensuring continuous improvement of adaptation and mitigation projects.

Morocco has integrated adaptation measures in different sectoral strategies, plans and programmes. These include the PNE, which aims to adapt water resources to climate change and proposes structural and non-structural actions for flood protection and to combat the effects of drought. Furthermore, it is worth highlighting the Wetlands and Natural Lakes Protection Programme, the Oasis Preservation and

²⁸⁶ Soutlan A, Wikelski M, Safi K. 2019. Risk of biodiversity collapse under climate change in the Afro-Arabian region. Available from: www.nature.com/articles/s41598-018-37851-6.

Desertification Control Programme and a GIZ-funded programme on Climate Change Adaptation, Biodiversity Enhancement and Implementation of the Nagoya Protocol. To improve the management of climate risks related to forests, in 2016, the country established the National Centre for Forest Climate Risk Management. The Centre is responsible for supervision and monitoring of forest fire prevention programmes at the national level. The Centre is deploying an integrated system that includes a dynamic risk prediction system for forest fire outbreaks and is also looking into the resilience and restorative capacity of ecosystems, among other adaptive measures.

11.4 Performance and gaps in biodiversity and forests monitoring networks

Species

Recommendation 9.1 of the first EPR urged relevant ministries and governmental bodies to conduct a systematic analysis of knowledge gaps relating to Moroccan biodiversity, which would provide the basis for a research plan to address the gaps identified, and which should be accompanied by a comprehensive needs assessment and an action plan. The main gaps identified are related to certain species and taxonomic groups, genetic resources, certain ecosystems and priority sites. This recommendation was partially integrated into the NBSAP (Axis E “Enhancing, valuing and sharing knowledge on national biodiversity”), but many gaps remain. The national evaluation of biodiversity and ecosystem services, launched in late 2019, is one response to this gap.

The same applies to the national Red List. In 2019, the Moroccan Bird Protection Research Group,²⁸⁷ which is the BirdLife partner in Morocco, with support from the Department of Water and Forests, launched the Red List of Morocco’s birds. The Scientific Institute of University Mohammed V of Rabat has published a Red List for flora,²⁸⁸ while the Hydrobiology Laboratory of Tétouan recently published a new Red List for dragonflies.²⁸⁹ These assessments provide more up-to-date and country-specific information on the conservation status of Morocco’s wild flora and fauna species.

Knowledge gaps on invasive alien species are more pervasive. The lack of coordination and available synthesized information reported in the first EPR remain to be addressed. In the absence of adequate

data, any assessment of trends in the threat posed by IAS is limited.

Forests and other ecosystems

The National Forest Inventory (NFI) provides a spatial database of forests based on aerial photographs and dendrometric data. An update is ongoing and aims to enhance knowledge and identify priority and sensitive areas. In addition to the NFI, the Forestry Research Centre works on the forest environment, natural ecosystems and sectors (timber, MAPs, hunting, and nature protection) and forestry techniques (plantation and enrichment with Atlas cedar, cork oak, pines and eucalyptus). This knowledge provides a basis for the Department of Water and Forests to prepare and implement several strategies focused on erosion control (e.g., by fixing dunes using revegetation), forest restoration, sylvo-pastoral (grazing) improvement and firefighting. The latter has proven to be effective in reducing the annual area burned and actions and measures on forests from the NBSAP have been assessed as effective and partly effective by the Sixth National Report on Biodiversity to the CBD.

Except for forests, there are gaps in knowledge on ecosystems, the ecosystem services forests provide and their role in ecosystem-based adaptation to climate change. As at February 2021, no comprehensive list or hierarchical typology of all ecosystems present at the national level is established. Knowledge on ecosystem dynamics and responses to management options and climate change is patchy, according to interviews. Programmes funded by international organizations exist and work to address these gaps, notably the GIZ programme (started in 2018) on ecosystem services, which aims to value biological diversity and ecosystem services in Morocco.

Given the gaps in knowledge on species and ecosystems, there is limited information available to identify and prioritize sites for conservation or restoration that fall outside the national park system. For example, the most recent assessment concerning Important Bird Areas (IBAs) is from 2001, and there is no monitoring system in place according to Birdlife International. Similarly, the conservation status of several SBEIs is far from certain, as is the status of the majority of the 38 Ramsar sites.

²⁸⁷ www.grepom.org/.

²⁸⁸ www.tela-botanica.org/wp-content/uploads/2018/09/LivreRouge_FVM_Fasc.9_Ver.1.pdf.

²⁸⁹ Liste rouge des odonates du Maroc.

11.5 Trends in the development and management of protected areas and ecological networks

Legally designated protected areas

As at April 2021, Morocco has 10 national parks,²⁹⁰ of which the most recent (Khenifra National Park) was established in 2008 (table 11.5). An eleventh national park, Dakhla National Park, is currently on the Morocco tentative list of UNESCO's World Heritage sites but has not been established yet by a national decree. Toubkal National Park and Ifrane National Park are candidates for the IUCN Green List of Protected and Conserved Areas.²⁹¹

The Exclusive Economic Zone (EEZ) represents a valuable marine ecosystem that supports an important and strategic sector of the country's economy and the livelihoods of coastal inhabitants. Given the importance of marine and coastal ecosystems, Morocco has sought to promote their sustainable management and protection (SDG target 14.2), but implementation gaps remain and many of Morocco's fisheries are currently overfished.

MPAs and no-take zones are widely used components of sustainable fishery management (SDG target 14.5)

and can contribute to the conservation of marine biodiversity. According to the IUCN World Database on Protected Areas, protected areas cover 4.27 per cent of Morocco's land area and only 0.69 per cent of its marine area within the EEZ. The shortfall on Aichi Biodiversity Target 11 (17 per cent for terrestrial) and SDG target 14.2 remains substantial. And this gap is likely to worsen as the parties to the CBD are likely to agree to increase protected area coverage when setting the post-2020 global biodiversity targets.

Since 2014, Morocco has made progress in extending its network of conservation areas to afford protection to species and habitats. In 2014, the Department of Marine Fisheries created three MPAs for sustainable fish resource management (IUCN Category VI). A fourth biosphere reserve was designated in 2016 – The Atlas Cedar Biosphere Reserve, covering 1,375,000 ha across the Ifrane, High Atlas Oriental and Khenifra National Parks.

Morocco also designated two new Ramsar sites in 2018 and another 12 in 2019. This brings its number of Ramsar sites to 38 (of 300 wetland sites in total), covering a total area of over 400,000 ha. Not all the designated Ramsar sites have protected area status under national law.

Table 11.5: Protected areas and nationally and internationally recognized areas

Protected sites	Area		Date of establishment
	Number	(ha)	
National parks	10	810 402	1942–2008
Toubkal		36 000	1942
Tazeka		133 737	1950
Souss-Massa		33 800	1991
Iriki		123 000	1994
Al Hoceima		48 460	2004
Talassemtane		58 950	2004
High Atlas Oriental		55 252	2004
Ifrane		124 150	2004
Khénifiss		185 000	2006
Khenifra		93 500	2008
Biosphere reserves	4	12 075 000	1998–2016
Arganeraie		2 500 000	1998
South Moroccan Oasis		7 200 000	2000
Intercontinental Biosphere Reserve of the Mediterranean		1 000 000	2006
Atlas Cedar		1 375 000	2016
SBEI	154	2 500 000	1996
Ramsar sites	38	320 000	1980–2019
MPAs	3	75 000	2014
Important Bird and Biodiversity Areas	49	4 618 624	2001

Source: Department of Water and Forests of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, 2020.

²⁹⁰ National Parks are IUCN Category VI protected areas (sustainable management of natural resources), due to their multiple uses (Protected Areas Master Plan until 2020).

²⁹¹ <https://iucngreenlist.org/>.

Photo 11.2: Thuja Forest, Essaouira Province

Photo credit: Department of Sustainable Development

Key biodiversity areas

In spite of these efforts, significant gaps remain. In 2020, protected areas cover 53.32 per cent of the country's Key Biodiversity Areas (KBAs), a marginal increase from 48.31 per cent in 2010. The coverage rate is 60.54 per cent for freshwater KBAs (58.82 per cent in 2010), 58.56 per cent for mountain KBAs (50.08 per cent in 2010), 56.46 per cent for terrestrial KBAs (51.15 per cent in 2010) and 53.43 per cent for marine KBAs (50.90 per cent in 2010). The country has therefore made only limited progress towards achieving SDG targets 15.1 and 15.4. As a silver lining, it appears that the protected area network is indeed prioritizing freshwater and mountain ecosystems, which are the most important for biodiversity. Geographically, the south of the country remains poorly represented in proportional terms within the national network of protected areas.

In 1996, the protected areas management plan identified 154 SBEIs, covering 2.5 million ha. They represent almost all Moroccan ecosystems; terrestrial (79), wetlands (38) and coastal areas (37). Their identification was the first step in a national strategy for the definition of a network of protected areas and

the development of plans for the development and management of national parks in Morocco.

The extension of the protected areas network to these 154 SBEIs was an aim of the 2010 Law No. 22-07 on Protected Areas, but this has not been fully implemented yet: only 30 SBEIs have proper management plans with restrictions on hunting, quarrying, tourism projects or other pressures. The remaining 124 SBEIs have not been reassessed since 1996 and could have been highly impacted by human activities.

Other initiatives have contributed to identifying priority sites for conservation. Nineteen Important Plant Areas (IPAs) were identified in 2011, but no plans have been established for their conservation, or that of the species that justify those designations. Similarly, 49 IBAs have been identified, covering 4,618,624 ha.

In 2017, the Critical Ecosystem Partnership Fund (CEPF) revised its "ecosystem profile" of the Mediterranean Basin Biodiversity Hotspot, which identifies 78 KBAs in Morocco.²⁹² Three of these, the Essaouira Dunes, Oued N'Fiss in the High Atlas and

²⁹² www.keybiodiversityareas.org/.

the downstream Abid River, have been categorized as irreplaceable because they contain 95 per cent or more of the known range of a globally threatened species. The previous ecosystem profile (2010) made specific mention of the importance of Toubkal National Park, Eastern High Atlas Mountains National Park, Ifrane National Park and the Eastern Middle Atlas area, which were noted to hold a significant number of threatened mammals, bird and reptile species. In addition, the 2017 ecosystem profile had reviewed and updated corridors identified in 2010. On a Mediterranean Basin Biodiversity Hotspot scale, corridors cover (partially or wholly) 77 per cent of KBAs. The priority corridors and their respective scales are listed in table 11.6. Unfortunately, the protection level of KBAs in these corridors is generally very low. For the Saharan Atlas, protected areas are yet to be defined. In the case of Oranie and Moulouya, a transboundary corridor between Morocco and Algeria, several Ramsar sites have been designated but the area suffers from the lack of enforcement of protection laws, notably the lack of endorsement for local managers responsible for the protected areas. Also, none of the KBAs in this area benefit from formal protection.

Table 11.6: Key biodiversity corridors

Corridor name	Country/ies	Area (ha)
Atlas Mountains Corridor	Morocco	10 662 000
Coastal Atlantic Plains	Morocco	1 329 700
Oranie and Moulouya	Morocco and Algeria	1 716 300
Rif Mountains	Morocco	1 549 300
Saharan Atlas	Morocco and Algeria	6 190 200

Source: Critical Ecosystem Partnership Fund, 2017.

It is to be noted that the total current size of the ecological network of Morocco cannot be calculated, as the national protected areas network, the SBEI network, the network of Ramsar sites and biosphere reserves overlap.

Management effectiveness

Recommendation 9.2 (a) of the first EPR urged the central public authorities in charge of the environment, water and forests, in cooperation with the managers of protected areas, conservation bodies and NGOs, to conduct evaluations of management effectiveness across protected areas and for other conservation plans/measures on a regular basis, with such evaluations institutionalized as part of the management process and considered to form a key part of adaptive management strategies, in order to ensure the conservation and sustainable use of natural

resources. This was partially implemented in 2020, when the national Court of Auditors conducted an assessment of national parks management and the contribution of national parks to biodiversity.

Findings of that assessment include an incomplete legal and institutional framework, despite Law No. 22-07 on Protected Areas, which is not fully enforced. The centralized governance of national parks, which are managed by the Department of Water and Forests, does not provide input for local stakeholders as recommended in good protected area management practices. Since 2009, only two parks (Souss-Massa and Toubkal) have designated a park-specific board of directors, but they do not have decision-making power or financial capacity. The preparation and revision of management plans is often delayed, and when they are issued, plans are underused, due to limited budgets and poor reporting requirements.

The Court of Auditors also highlighted poor enforcement of protection rules and monitoring of environmental violations, which negatively and permanently impact national parks' assets. For instance, in Ifrane National Park, local farmers and herders who have turned to modern agricultural methods are rapidly altering the park's ecosystems. In Talassemtane National Park, intensification of agriculture increases soil erosion and has impacts on biodiversity through excessive use of pesticides and a high demand for water.

The first EPR also recommended (Recommendation 9.2 (b)) that the authorities and relevant stakeholders focus on building capacities for implementation and enforcement of conservation measures through financing, investment and training. The 2020 report by the Court of Auditors also highlighted that significant gaps in financing of national parks and protected areas remain. While the SNDD puts emphasis on financial resources mobilization, operational details are lacking. In the absence of official data from the Department of Water and Forests, several interviews confirmed that the management of national parks and protected areas continues to suffer from a lack of budgets and appropriate business plans. More training is required, including on financial management, in order to close this gap.

The recognition of local communities and their involvement in the management of protected areas have improved slightly over the past decade, with the 2011 Constitution, Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development and Law No. 22-07 on Protected Areas, which requires a stakeholder consultation

process for the preparation of protected area management plans. Interviews with relevant stakeholders highlighted that partnerships with local communities could be included in management plans, which would need to be approved by a specific authority, such as a national agency for nature conservation, which does not exist. Such partnerships are new, and their rollout is still limited by capacity gaps and resistance to change in existing protected areas. Some of the SBEIs that are still unprotected could benefit from more flexible community-based approaches and could serve as useful pilots. Several initiatives have promoted such community-managed protected areas.²⁹³ These include the Association of Teachers of Life and Earth Sciences of Morocco, through a project funded by GIZ and UNDP that started in 2016.

Engagement with private landowners and private resource users (e.g., mining leaseholders and resort developers) is also a challenge in some cases, but data on usage conflicts are not readily accessible.

11.6 Legal, policy and institutional framework

Legal framework

The new Constitution (2011) stipulates the protection of the environment and sustainable development and a healthy environment as a right of every citizen.

As discussed in the first EPR, relevant laws for biodiversity include, notably, the 2003 Law No. 11-03 on the Protection and Conservation of the Environment, which lists species requiring specific protection, and prohibited activities posing a threat to endangered, threatened or rare species. Several species conservation programmes have already been adopted, such as for Cuvier's gazelle, the northern bald ibis, Barbary sheep, Barbary macaque and several marine species.

The 2010 Law No. 22-07 on Protected Areas focuses mainly on the definition of protected areas, their creation, classification, development and management. It aims to create a national network of protected areas that can cover the national territory and thus protect biological diversity and the nation's natural and cultural heritage.

The main objective of the 2011 Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade is the protection and conservation of wild species through the control of

trade. The Law enshrines a precautionary principle, which guarantees sustainability of the living natural heritage.

To complete the legislative and regulatory framework for environmental protection and sustainable development related to biodiversity, new legislative texts have been adopted since 2011.

Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development was adopted in March 2014. This law is seen as a turning point and a substantial change in approach, and as a major step towards integrating environmental concerns into development policies at all levels. The CNEDD includes the main principles of sustainable development and provides the basis for Morocco's environmental and climate policies.

The 2015 Law No. 81-12 on the Coastal Zone deals with coastline management and protection. The Law calls for the establishment of integrated management and balanced development of the coastline and the protection of the coastline against all forms of pollution and degradation, as well as the integration of the environmental dimension into all sectoral policies relevant to this area.

The 2016 Law No. 36-15 on Water is the main law applicable to water resources management and implementing the PNE, prepared in 2015. Among other matters, the Law covers the conservation of water resources and the natural environment, as well as climate change adaptation, through conservation of the quality of the water resources, sustainable groundwater management, watershed development and the protection of sensitive areas (wetlands and oases).

The 2014 Law No. 15-12 on the Prevention and Combating of Illegal, Undeclared and Unregulated Fishing determines the rules applicable to foreign fishing vessels landing and transshipping fishery products in Moroccan ports.

The 2013 Law No. 39-12 on the Organic Production of Agricultural and Aquatic Products strictly prohibits genetically modified organisms (GMOs). In spite of border controls on the import of GMOs, a 2019 review of biosecurity under the Cartagena Protocol on Biodiversity indicated several implementation gaps. In addition, in-country monitoring or enforcement of the ban is limited. GMOs may thus be more widespread than current knowledge suggests.

²⁹³ "Territories and areas conserved by indigenous peoples and local communities" or "territories of life": www.iccaconsortium.org.

Photo 11.3: Barbary macaque (*Macaca sylvanus*)

Photo credit: Department of Sustainable Development

The need to conserve genetic resources and associated traditional knowledge, and share its benefits, is encapsulated in SDG targets 2.5 and 15.6, as well as the Nagoya Protocol.

Since the first EPR, which highlighted a major gap in knowledge and conservation of genetic resources (Recommendation 9.1), the country adopted a set of national principles in 2013, even though it has not ratified the Nagoya Protocol. However, the legal framework is not yet fully operational, which means that the country is not yet on track with the implementation of SDG targets 2.5 and 15.6. Once adopted, the draft law No. 56-17 on access to genetic resources and the fair and equitable sharing of benefits arising from their use and knowledge would outline how Morocco will implement access and benefit-sharing (ABS). It is expected to establish a legal framework to guarantee and control access to genetic resources and the protection of traditional knowledge, and also define rules guaranteeing fair and equitable benefit-sharing arising from the use of these resources. In order to support the development of the draft law, a regulatory impact study was carried out to assess the potential positive and negative effects of its implementation.

Overall, the legislative framework in Morocco has undergone substantial improvements since 2012, notably by incorporating international environmental commitments including biodiversity protection within new or amended legislation. However, it still contains several outdated laws and decrees. For example, forest conservation and protection are regulated by original legislation from 1917, amended several times, and hunting rules originate in 1923. Law enforcement is still an issue, with a lack of secondary legislation to make it efficient and applicable in practice. Notably, the 2010 Law No. 22-07 on Protected Areas has not yet been fully implemented, which is demonstrated by the slow designation of new protected areas. Further, as already identified in the first EPR, strong legislation to protect sensitive oasis and mountain areas is missing. The topic is currently partially covered within Sustainable Development Action Plans and the Oasis Preservation and Desertification Control Programme, together within the 2007 regulation regarding the sustainable development of palm trees and protection of date palms (*Phoenix dactylifera*). Protection of these valuable zones will be strengthened and ensured through the adoption of legislation, as already recommended in the first EPR (Recommendation 9.5).

Policy framework

National Biodiversity Strategy and Action

Plan

Approved in 2016, the NBSAP aims to improve the integration of biodiversity issues into Morocco's national strategies. The NBSAP establishes biodiversity as a key pillar for sustainable development and the well-being of Moroccan society. Interestingly, the NBSAP contains specific objectives that aim to integrate the economic, social and cultural values of national biodiversity and ecosystem services into decision-making and sectoral planning processes (Objective C1), and to implement a national roadmap to raise awareness and encourage behavioural change towards the national biodiversity heritage, targeting individuals, communities and businesses alike (Objective F1). This is one of the main recommendations of the first EPR (Recommendation 9.3 (a) and (b)).

Morocco's Sixth National Report on Biodiversity to the CBD was prepared in 2018 and published in 2019. It describes the outcomes of the implementation of the NBSAP in relation to the Aichi Biodiversity Targets and the performance of relevant sectors, together with the challenges of safeguarding biodiversity and ecosystem services as national priorities. The Report highlighted many of the actions in the NBSAP as having been completed (23 per cent) or started. Some of the actions contributing to Aichi Biodiversity Target 17 are subject to implementation in the coming years, including updating national legislation in order to preserve biodiversity. As at 2019, 14 per cent of actions had not yet started and 58 per cent showed limited or partial results.

National Sustainable Development Strategy

Furthermore, the SNDD, adopted in June 2017, covers the vision stated in the National Charter for the Environment and Sustainable Development (CNEDD), and incorporates the SDGs, NDCs and NAMAs, as well as the national vision for advanced regionalization. The SNDD was drafted based on the measures set out in Framework Law No. 99-12 on the National Charter. It introduces seven main challenges with 137 detailed underlying development objectives to operationalize the Strategy. Biodiversity-oriented topics are covered in challenge 3: "Improve the management and re-use of natural resources and strengthen biodiversity conservation". The SNDD was developed from consideration of all existing sectoral strategies, plans and programmes and analysis of them from a sustainable development perspective. The SNDD serves as a reference framework for

implementation of the SDGs and the country's other environmental and sustainable development commitments. The SNDD is implemented at the local level through regional sustainable development strategies.

Sectoral Sustainable Development Action Plans prepared under the SNDD also include some adaptation actions proposed by ministerial departments. For example, the Department of Sustainable Development has included an adaptation action about oasis conservation in its Action Plan.

Other policies and strategies

In February 2020, two new strategies were launched by the Government, aiming to consolidate achievements and involve all stakeholders in the preservation of biodiversity. Generation Green 2020–2030 aims to consolidate the achievements that Morocco has made in the agricultural sector through the PMV 2008–2020 and create new income-generating activities, mainly in favour of young people in rural areas. It makes a clear link to the safeguarding of natural resources for sustainable agriculture. Forests of Morocco 2020–2030 aims to make forests a space for development, ensure the sustainable management of their resources, strengthen their productive capacities and preserve biodiversity. Forests of Morocco 2020–2030 also seeks to repopulate 133,000 ha of forests by 2030. Furthermore, two national agencies are expected to be created, including one dedicated to the management of protected areas.

The National Integrated Coastal Zone Management Plan (PNL), adopted in February 2020, promotes the resilient, inclusive, sustainable and efficient development of the country's coastline, with the objective of reconciling environmental protection and economic activity.

The National Wetlands Strategy 2015–2024 and Action Plan were launched in 2017 and anticipate: including 30 new Moroccan sites in the Ramsar List of Wetlands of International Importance; implementation of 60 priority integrated wetland restoration action plans; sensitization of nearly 50,000 people per year within the framework of the nature animation programme for wetlands; and developing four sustainable value chains for wetlands (bird watching, artisanal fisheries, integrated aquaculture, and fishing tourism). This Strategy was funded by GIZ and was a result of the project "Adaptation to climate change/Implementation of the Nagoya Protocol", which aims to build capacities to integrate ecosystem

services and climate change adaptation into regional and community development plans.

In the context of the PANLCD, several activities have been implemented since 2014, including operationalization of a monitoring system and the establishment of two Technical Centres for Desertification Monitoring, watershed management on 800,000 ha with mechanical correction of ravines, water erosion control over 250,000 ha between 2015 and 2019, and control of siltation in continental and coastal areas over 41,000 ha. Finally, fodder shrub resources were planted over 650,000 ha in response to overgrazing by transhumant herders. These activities directly contribute to SDG target 15.3. Between 2000 and 2015, the proportion of total land area considered as degraded stood at 5.35 per cent.

The Reforestation Master Plan (started in 1970) includes measures to increase the annual area reforested fivefold, from 18,000 ha in the early 1980s to 98,000 ha at the end of 2016. However, the current rate of reforestation remains insufficient to balance the forest degradation trend and to meet the country's needs for wood products.

There are several challenges to ensuring successful implementation of various strategies. First, the policy framework suffers from insufficient coordination among the various sectoral ministries and departments at the national level, as well as in relation to regional authorities. No detailed implementation plan is in place that includes the participation of stakeholders from the Government, private sector, civil society or financial institutions, and sufficient financial resources are lacking. An additional problem lies in the integration of biodiversity within the overall sustainable development framework, which has to account for other priorities, such as the requirements of the market economy, employment, conservative consumer-driven development or non-sustainable use of resources.

Institutional framework

The key role lies with the Ministry of Energy Transition and Sustainable Development, and its Department of Sustainable Development. It oversees the implementation of NBSAP and CBD commitments (Aichi Biodiversity Targets), and the management of the biodiversity information platform.²⁹⁴ Furthermore, it leads the work of the new National Commission on Climate Change and Biodiversity (the first meeting of which was organized in December 2020).

ONEDD, as part of the Ministry of Energy Transition and Sustainable Development, prepares the national state of the environment report, coordinates all focal points engaged in the implementation of the SNDD, coordinates the Regional Observatories of the Environment and Sustainable Development (OREDDs) and manages environmental databases, including information on biodiversity.

The Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests and its Department of Water and Forests (formerly the High Commission for Water, Forestry and the Fight against Desertification) is responsible for the management of all terrestrial protected areas, but also for the management of the entire public forest domain, including some areas that are not protected. The 20-to-30-year management plans aim for sustainable and rational forest management, including reforestation and regeneration, prepared on the basis of ecological and socioeconomic analyses. Since 2000, these analyses, and the management plans, include a biodiversity component and contributions towards combating desertification and providing local communities with improved access to non-timber forest products. Furthermore, the Ministry is responsible for conservation programmes on biodiversity, including endangered species. The Department of Marine Fisheries manages all marine species stocks and the Moroccan seashore, as well as MPAs.

The Directorate responsible for research and planning within DGE of the Ministry of Equipment, Transport, Logistics and Water is developing a Standardized Global Biological Indicator (IBGN). This indicator will show the ecological status of freshwater ecosystems and will consider physiochemical characteristics, national indicators and thresholds.

The Ministry of Land Management, Urban Planning, Housing and Urban Policy and its Urban Development Department is responsible for all territorial spatial planning and strategic management, including regional spatial planning strategy. The Department is aware of the necessity to integrate biodiversity and natural resources issues in spatial planning strategies.

The Ministry of National Education, Preschool and Sports is responsible for coordination of all universities and research programmes, including biodiversity research, as well as the National Strategy for Education and Awareness of the Environment and Sustainable Development.

²⁹⁴ <http://ma.chm-cbd.net/>.

The National Commission on Climate Change and Biodiversity was created by the 2020 Decree No. 2-19-721. It is composed of representatives of governmental authorities, public institutions and environmental research institutions, as well as three representatives of the most important civil society organizations working on climate change or biological diversity. The Commission is subdivided into two subcommissions, one on climate change and one on biodiversity. The Subcommission on Biodiversity maintains key biodiversity competences, such as organizing and preparing CBD conferences and related reports, and validating projects or studies or programmes related to CBD objectives. It also has additional competences, such as consultation for SNDD actions related to biodiversity. This set-up is expected to facilitate coordination between the SNDD and NBSAP, including sharing experiences. The creation of this entity is in line with Recommendation 9.4 of the first EPR, aiming at promoting cross-sectoral and interdisciplinary initiatives and develop coordinated, and mutually agreed, instruments for effective biodiversity conservation.

Major specialized agencies

INRA manages a “genetic bank” (*ex-situ* conservation) at the national level and developed a research programme on seeds and local breeds, which aims to combat genetic erosion.

Since 2010, the National Agency for the Development of Oasis and Argan Zones (ANDZOA) is in charge of revitalizing oases and argan areas, including the Arganeraie Biosphere Reserve (RBA), while maintaining their ecological balance. This involves raising awareness among oasis users on the state of the ecosystems and the need to conserve and restore them in response to desertification.

The Forestry Research Centre coordinates forestry research and develops cooperation and partnerships with research, training and funding institutions at the national and international levels. It offers scientific and technical support to water and forestry managers and meets their needs so that they can operate under the best possible conditions and carry out their projects for the preservation and development of natural resources.

The National Centre for Forest Climate Risk Management, set up in 2016, specializes in the management of climate risks related to forests. It monitors the effects of climate change on forest viability, including in some national parks, and thus aims to protect biodiversity.

The mission of the INRH is to assess and monitor fishery resources, study the functioning of marine and coastal ecosystems, and monitor the quality and health of the marine environment. The Institute is in charge of testing fishing techniques and the valorization of products sourced from the sea, and evaluating the aquaculture potential of the national coastline and carrying out research to contribute to the development of Moroccan aquaculture. The INRH ensures the monitoring of marine resources and develops education programmes aimed at training scientists and technicians specialized in marine biodiversity and genetics.

The first EPR highlighted that the institutional framework at the time suffered from serious shortcomings, undermining the integration of biodiversity aspects into public policies, strategies and other programmes. The institutional changes made since, notably the creation of the National Commission on Climate Change and Biodiversity, are promising. The institutionalization of the Subcommission on Biodiversity is expected to support the better integration of biodiversity into decision-making and mobilization of its members. The fact that biodiversity and climate change have been merged into a single Commission is expected to facilitate better coordination between the SNDD and NBSAP, including sharing experiences. It remains to be seen how this is translated into practice, not only at the national level but also at the regional and local levels.

Regulatory, economic, fiscal and information measures

Regulatory aspects

An important regulatory aspect that undermines the efforts to conserve and sustainably manage biodiversity and ecosystems is the poor quality of many environmental impact assessments (EIAs) and the lack of monitoring and enforcement of environmental management plans (chapter 2). As highlighted in the first EPR, the assessment of impacts on biodiversity is often conducted in only a general manner, without consideration of a specific site. This is a particular issue for linear infrastructure (e.g., roads, railways and power lines), as well as for renewable energy projects. In order to enhance the EIA standards, relevant guidelines and guidance on biodiversity management in key sectors were prepared and disseminated. Furthermore, awareness is low among the relevant stakeholders – including ministerial departments, notably those dealing with agriculture, energy and transport, and investors, business people and civil society – about the benefits of better EIA, which would enhance the long-term

sustainability of projects and create synergies between EIA and other strategic goals, such as the climate agenda.

Economic and financial aspects

In 2016, the then Ministry of Energy, Mines, Water and Environment, supported by GEF and UNDP, prepared a financial report on Morocco. This unpublished report highlighted progress on the mobilization of financial resources, including national and international contributions, particularly in the field of the environment. In the period 2006–2010, annual national investment in biodiversity reached an average of 2.4 billion dirhams (equivalent to approx. US\$270 million²⁹⁵). The funding needs for the period 2016–2020 were estimated at more than 3.4 billion dirhams annually. About 1.1 billion dirhams were expected to come from international sources, while the rest, presumably, would originate from the national budget (specific information on the origin of sources was not provided). While the Ministry reported on some measures to engage NGOs and academia, there were no specific initiatives targeting the private sector at the time the report was published. Interestingly, the

report suggested a strong budgetary surplus for the period 2016–2020 (available resources surpassing financing needs by over 10.7 billion dirhams). This is not consistent with the findings of the various reports and interviews conducted for this EPR, suggesting that biodiversity and ecosystems is an area that is largely underinvested. As at February 2021, no consolidated report that would provide an update on the actual mobilization of resources for biodiversity for the period 2016–2020 had been issued.

Some additional information can be found in the 2020 VNR. In line with SDG target 15.a, the VNR highlights the growing importance of mobilizing financial resources from all sources in order to finance programmes for the preservation and sustainable management of biodiversity and ecosystems. As an example, the budget dedicated to the forestry sector increased by 70 per cent in the last decade (with the National Forest Fund contributing up to 80 per cent). Similarly, the budget for combating desertification and protecting the natural environment has increased by over 30 per cent since 2010. The VNR did not include any more information on SDG indicators 11.4.1 and 15.b.1.

Photo 11.4: Northern bald ibis (*Geronticus eremita*)



Photo credit: Department of Sustainable Development

²⁹⁵ Exchange rate as at February 2021.

The National Report on Biodiversity, which is published by the Clearing House Mechanism on Biodiversity of Morocco to report on Morocco's initiatives for implementation of the CBD, provides additional clarifications on resource mobilization for biodiversity. The Sixth National Report on Biodiversity to the CBD states, notably, that there is no specific resource mobilization strategy for the realization of the NBSAP.

It should be noted, however, that many bilateral and multilateral collaborations exist in order to strengthen national capacities or raise funds to initiate projects. Since its creation, the Department of the Environment (now the Department of Sustainable Development) has set up several agreements, memoranda of understanding and declarations of cooperation (bilateral as well as multi-stakeholder) in the field of the environment with partner countries (in particular, Belgium, Canada, France, Germany, Italy and Spain, and also with the European Union). This has given rise to a number of projects on the ground, including the ongoing national assessment of biodiversity and ecosystem services, funded by GIZ.

The GIZ-funded project "Ecosystem services in Morocco: Quantification, mainstreaming and integration of the private industry" (2018–2022) aims to: further develop expertise; involve the value of biodiversity and ecosystem services in economic planning; develop, together with the private sector, new incentive systems and cooperation mechanisms for the protection and sustainable use of ecosystems; and improve the institutional and legal framework for the sustainable use of biological diversity and the assessment of ecosystem services.

Since 2010, activities have been carried out to revitalize oases while maintaining their ecological balance, including through awareness-raising among oasis users on the state of the ecosystems and the need to conserve and restore them in response to desertification. With respect to SDG target 15.3, the 2020 VNR highlights several initiatives, among which are adaptation of the PANLCD to local specificities: operationalization of the monitoring system and watershed development works (covering 800,000 ha) and combating water erosion (covering 250,000 ha) between 2015 and 2019. The proportion of total land area considered as degraded was 5.35 per cent as at 2015. No more recent data are available.

Information measures

Data on species and habitats remain fragmented. This is demonstrated, notably, by the multiple gaps in the IUCN Red List of Threatened Species, as well as the

absence of a comprehensive national Red List. Furthermore, there are multiple areas of insufficient knowledge on ecosystems, the services that these ecosystems provide and their role in ecosystem-based adaptation to climate change. The national evaluation of biodiversity and ecosystem services conducted with the support of GIZ is expected to bring a substantial contribution to bridging this gap.

On the international level, the Clearing House Mechanism of Biodiversity of Morocco, established in connection with the CBD, is contributing to a synthesized knowledge base for Morocco. As for monitoring and reporting on the relevant SDGs, the Court of Auditors noted that an appropriate system still has to be established.

Within the framework of raising awareness on the preservation of natural protected areas, the Department of Culture, in collaboration with the Embassy of Peru in Morocco, organized a photographic exhibition, "Natural Protected Areas of Peru", at the Mohammed V Theatre in Rabat on 1 October 2019 to inform the public about the "Third International Congress of Protected Areas of Latin America and the Caribbean", which took place in Lima, Peru, 14–17 October 2019.

In 2013, in partnership with UNDP and GEF, the then Department of the Environment led a project aimed at developing a national ABS framework and building capacity for its implementation. The project ended in 2019 but led to the development of a guide to ABS intellectual property rights in Morocco and a methodology for the identification of traditional knowledge associated with genetic resources, which is now available. Moreover, awareness-raising and communication campaigns were implemented throughout the country.

11.7 Assessment, conclusions and recommendations

Assessment

Morocco has rich biodiversity, which is characteristic of the Mediterranean Basin, one of the world's 35 Biodiversity Hotspots. Its diverse ecosystems harbour a large number of threatened species, many of which are endemic to Morocco.

Biodiversity and ecosystems in Morocco are threatened by overgrazing, fishing, agriculture and urban expansion, among other threats, many of which are closely related to the population pressures. Loss of forests, soil and water pollution and habitat fragmentation make the pressures on biodiversity and

ecosystems particularly acute. Accelerating climate change further exacerbates these threats.

Recommendation 9.1 of the first EPR was partially integrated into the NBSAP, but many gaps remain, particularly in the knowledge of species and taxonomic groups, certain ecosystems and priority sites. The national evaluation of biodiversity and ecosystem services is one response to this gap. When it comes to knowledge and conservation of genetic resources, the country adopted these principles at the national level in 2013, but the legal framework is not yet fully operational. Knowledge gaps on IAS are more pervasive. Overall, Recommendation 9.1 was only partially implemented.

Since 2014, Morocco has made progress in extending its network of conservation areas to allow for protection for species and habitats, covering a broad variety of ecosystem types, including freshwater and mountain ecosystems, which are the most important for biodiversity. However, international protected areas goals, especially for MPAs and identified SBEIs, are not achieved.

Recommendation 9.2 was partially implemented in 2020, when Morocco's Court of Auditors conducted an assessment of national parks management and the contribution of national parks to biodiversity conservation. However, gaps remain, particularly in management effectiveness and the limited participation of local communities. The first EPR also recommended that the authorities and relevant stakeholders focus on building capacities for implementation and enforcement of conservation measures through financing, investment and training. The lack of detailed budgetary and financial information makes it difficult to make conclusive statements but the interviews with relevant stakeholders confirmed limited progress.

The legislative framework in Morocco has undergone substantial improvements since 2012; however, it still contains several outdated laws and decrees. Law enforcement remains an issue, with a lack of secondary legislation to make the laws efficient and applicable in practice. Notably, the 2010 Law No. 22-07 on Protected Areas has not yet been fully implemented, which is demonstrated by the slow designation of new protected areas. Further, as already identified in first EPR, strong legislation to protect sensitive oasis and mountain areas is lacking. This topic is currently partially covered within Sustainable Development Action Plans and the Oasis Preservation and Desertification Control Programme, together within the 2007 regulation regarding the sustainable development of palm trees and protection of date

palms. Protection of these valuable zones should be strengthened and ensured through the adoption of legislation, as recommended in the first EPR (Recommendation 9.5).

The country has also made some progress in integrating biodiversity and ecosystem considerations into policies, strategies and other programmes, in an attempt to effectively consolidate conservation and socioeconomic goals, which is in line with Recommendation 9.3 (a) of the first EPR. However, there are several challenges to doing so, notably, the insufficient coordination among the various sectoral ministries and departments at the national level, and in relation to regional authorities, as well as the lack of financial resources to ensure adequate implementation of these strategies and policies. The NBSAP includes a specific objective to raise public awareness of biodiversity conservation matters, which directly responds to Recommendation 9.3 (b) of the first EPR. However, this objective is still not reached, which implies that Recommendation 9.3 (b) remains valid.

From an institutional perspective, the recent reforms – notably, the institutionalization of a biodiversity sub-commission within the National Commission on Climate Change and Biodiversity – is an important step forward to making biodiversity a priority and allowing for better coordination among the relevant national strategies. The creation of this entity is in line with Recommendation 9.4 of the first EPR. However, it remains to be seen to what extent it will effectively help in overall coordination, data and knowledge-sharing and addressing other implementation gaps.

The regulatory system in Morocco suffers from the poor quality of many EIAs and the lack of monitoring and enforcement of environmental management plans. As highlighted in the first EPR, and with limited improvements since, the assessment of impacts on biodiversity is often conducted in only a general manner, without consideration of a specific site.

Data on economic and financial measures are rather fragmented. However, the analysis suggests that Morocco has maintained a steady level of resource mobilization for biodiversity, including from international sources. However, there is no specific resource mobilization strategy attached to the NBSAP. The private sector is not involved at this stage. There are multiple synergies among protecting and enhancing biodiversity, climate change and other development goals, particularly in sectors such as regenerative agriculture, forestry and fisheries and ecosystem restoration. Nature-based solutions, with their important economic, environmental and social benefits, have a particularly important role to play.

Given the large financing needs, there is an opportunity to create an enabling environment for both donors and private-sector investors and develop appropriate economic and financial instruments to support biodiversity.

Concerning the implementation of SDG targets relevant to biodiversity and protected areas, Morocco has made only limited progress and most of the objectives are not on track. No data conducive to achievement are available for SDG targets 6.6, 15.6, 15.9 and 15.c, while the data for other targets (e.g., SDG target 15.3) have not been updated since 2015. The accelerating loss of biodiversity and ecosystem services suggests that the relevant SDG targets and the Aichi Biodiversity Targets will not be achieved on the basis of current trajectories.

Conclusions and recommendations

Continuous improvement of biodiversity knowledge

Gaps remain in basic knowledge of endemic and threatened species, invasive alien species, and terrestrial and marine ecosystems. Although recommended in the first EPR, resources into biodiversity research and monitoring capacity are not efficiently channelled. Equally important is the actual use of information on biodiversity in public and private sector decision-making, which requires information to be regularly updated and made available in an appropriate format. A clearer institutional mandate to collect, organize and make biodiversity data publicly available could fill this gap.

Recommendation 11.1:

The Government, through the Department of Sustainable Development and the ministry responsible for agriculture, marine fisheries, rural development and waters and forests, in cooperation with other relevant governmental bodies, the scientific community and NGOs, and with possible support from international donors, should:

- (a) *Conduct a regular and systematic analysis of knowledge gaps relating to Moroccan biodiversity, which would provide the basis for a research plan to address the gaps identified, and which should be accompanied by a comprehensive needs assessment and action plan;*
- (b) *Finalize and disseminate the national assessment of biodiversity and ecosystem services, including an updated list of species;*

- (c) *Improve the biodiversity monitoring and information-sharing system and ensure the collection of data for the indicators specified in national policies and international commitments.*

Enhancing effectiveness and coverage of protected areas

Progress has been made in expanding the protected area network. However, international protected areas goals, especially for MPAs and identified SBEIs, and management effectiveness, including improved participation of local communities, are not achieved.

Recommendation 11.2:

The Government should:

- (a) *Increase the number and area of marine protected areas, aligning with the global (post-2020) framework for biodiversity and as a key contribution to the sustainability of fisheries;*
- (b) *Ensure that all protected areas have updated management plans and business plans, based on recent diagnosis and evaluation, that effectively incorporate feedback from local communities and other relevant stakeholders;*
- (c) *Build the technical and financial capacity for protected area management (monitoring and evaluation of key performance indicators, including budgets and staff) at the central government level, and for each protected area.*

Mainstreaming biodiversity in the institutional and policy framework and ensuring better coordination

The recent structural reforms, notably, the institutionalization of the Subcommittee on Biodiversity within the National Commission on Climate Change and Biodiversity, making biodiversity a priority and allowing for better coordination between the relevant national strategies (SNDD and NBSAP), represent a substantial improvement in the institutional framework. However, the institutional reform is not finalized, competencies are not clear and coordination among the relevant institutions at all levels is limited. Resources (budget and staff) are limited and their allocation is not optimal. Knowledge, including data, to bridge the gap between high-level biodiversity commitments and practical implementation on the ground is not effectively shared across different sectors and levels.

Recommendation 11.3:

The Government should:

- (a) *Enhance the role of the newly created National Commission on Climate Change and Biodiversity, by allocating sufficient resources, strengthening cooperation among different stakeholders, both private and public, and ensuring that the results of the Commission's work are properly taken into account and implemented by the relevant authorities;*
- (b) *Ensure biodiversity mainstreaming into national plans, strategies and policies and ensure the sharing of experiences;*
- (c) *Improve the capacity and knowledge of biodiversity aspects within the authorities at all levels through capacity-building schemes, exchange programmes and cooperation with the international community, while extending and enhancing collaboration with the academic sphere focused on biodiversity conservation.*

Better quality environmental impact assessment

Biodiversity mainstreaming suffers from the inadequate quality of many EIAs, and the lack of monitoring and enforcement of environmental management plans. This is a particular concern for transport infrastructure, wind power projects and power lines, which cause ecosystem fragmentation and impose barriers to wildlife movement. Relevant stakeholders (investors, businesses, sectoral government departments and civil society) are not sensitized on the preparation and uptake of higher EIA standards.

Recommendation 11.4:

The Department of Sustainable Development, in collaboration with relevant government agencies, NGOs and international donors, should raise

awareness among the public and economic stakeholders on the consideration of biodiversity in the planning and implementation of investment projects, by

- (a) *Preparing and disseminating guidelines that consider biodiversity in environmental assessments and environmental management plans in accordance with national laws and international good practices;*
- (b) *Raising awareness among various private and public stakeholders of the need to consider natural ecosystems and biodiversity in environmental assessments.*

Enabling environment for research on ecosystem-based adaptation to and investments in nature-based solutions to climate change adaptation

The current policy and economic environments are not conducive to leveraging resources from donors and private-sector investors to help Morocco achieve SDGs, climate and biodiversity targets. The areas of regenerative agriculture, forestry and fisheries and ecosystem restoration are lacking these resources. Some research on biodiversity is ongoing; however, the country lacks research capacity on ecosystem-based adaptation to climate change.

Recommendation 11.5:

The Government, in coordination with relevant partners such as financial institutions, should:

- (a) *Increase national research capacity on ecosystem-based adaptation to climate change through a dedicated programme, building on work already initiated on ecosystem services and nature's contributions to people;*
- (b) *Prepare and implement a roadmap to involve the private sector in investments in projects aligned with national priorities for climate, biodiversity and to combat desertification.*

Chapter 12

COASTAL ZONE MANAGEMENT

12.1 Principal characteristics of the Mediterranean and Atlantic coasts of Morocco

Physical description – A pivotal location

Geological overview

From south to north, there are four distinct geological domains in Morocco: the Anti-Atlas domain and its Saharan extension, Atlas domain, Meseta domain and Rif belt domain. These domains are separated from each other by the South Atlas Accident on the one hand and the boundary of the tertiary wedges running from the north on the other.

A coastline of 3,500 km stretches along the sea border of Morocco. Almost 500 km of coast faces northwards to the Mediterranean and almost 3,000 km towards the Atlantic Ocean in the west. From east to west, the Mediterranean littoral in the north of Morocco appears as a series of concave sections. The coastline is generally rocky and steep, occasionally dropping down to stretches of sand dunes. The coast reveals erosion that is typical of the extension of a continental shelf which, despite being relatively broad for a Mediterranean coastline, is narrow compared with the Atlantic shelf.

Between the headlands of Cap Spartel and Lagouira (Cap Blanc), the Moroccan Atlantic littoral is, in contrast to its Mediterranean littoral, rarely indented and highly regular, forming broad, semi-circular sweeps that are sometimes concave and sometimes convex. In general, the continental shelf slopes gently down to open waters before descending steeply into the ocean depths. The distance of the shelf edge from the coast extends from 3 km at Cap Spartel to over 38 km at Cap Juby to the north of Tarfaya. The shelf is made up mainly of a sandy littoral zone succeeded by a zone of deeper waters filled with coral mounds of between 120 m and 170 m in length.

Hydrology and hydrodynamics

The climate of Morocco, influenced as it is by the Mediterranean to the north, the ocean to the west and the continent and Sahara to the east and south of the country, is marked by irregular rainfall resulting in an unstable water regime. The presence of a chain of mountains running east to west, combined with extremely varied geological and geomorphological characteristics, means that surface water and groundwater resources are unequally distributed. The northern watersheds – Loukkos, Tangier and the Mediterranean Coast, and Sebou – alone account for more than half of the hydraulic potential of Morocco, although they occupy less than one tenth of the surface area of the country.²⁹⁶

From a hydrogeological perspective, Morocco possesses nine large-scale hydraulic basins. The impact of seawater intrusion is acutely felt on the Atlantic littoral, as is the case with the Gharb and Souss aquifers. On the Mediterranean coast, the Ghiss-Nekkour aquifer could ultimately be threatened with salinization, and the accompanying vulnerability is already being felt.²⁹⁷

The marine hydrodynamics generally observed along the Moroccan Atlantic coast are dominated by a strong swell running north-west to south-east. The typically semidiurnal tides have a range of between 2 m and more than 3 m. The currents generally circulate from north-east to south-west, strengthened in periods of the year by the trade winds and upwellings, which are rising cold, nutrient-rich waters, in the north (region of Larache), central (region of Essaouira) and south (Tantan and Dakhla) zones. The Mediterranean coastal hydrodynamics in Morocco are dominated by the continuous inflow of surface waters from the Atlantic. This is particularly strong in summer when evaporation of the Mediterranean is at its height. As elsewhere in the Mediterranean, the general circulation may be locally modified by different, seasonally dependent wind regimes.

²⁹⁶ S. Riad, "Typologie et analyse hydrologique des eaux superficielles à partir de quelques bassins versants représentatifs du Maroc" [Surface Water Typology and Hydrological Analysis Based on Some Representative Watersheds in Morocco]. Civil engineering PhD. Lille University of Science and Technology and Ibnou Zohr University in Agadir, 2003.

²⁹⁷ T. Kouz, and others, "Application of GALDIT Index to Assess the Intrinsic Vulnerability of Coastal Aquifer to Seawater Intrusion: Case of the Ghiss-Nekor Aquifer (North East of Morocco)" in *Groundwater and Global Change in the Western Mediterranean Area. Environmental Earth Sciences*, Maria Luisa Calvache, Carlos Duque and David Pulido-Velazquez, eds. (Springer, Cham, 2017).

**Photo 12.1: Merja Zerga (or Moulay Bou Selham Lagoon),
a tidal lagoon on the Atlantic coast of Morocco**



Photo credit: Department of Sustainable Development

Abiotic and biotic characterization

Watershed morphology and the progressive development of vertical drops in river courses are the source of topographical, climatic and biogeographical differences and thus of varied and complex ecosystems. The particular geographical situation of Morocco, with two distinctive maritime coasts, produces diverse bioclimates within the country, ranging from humid to arid. The result is a hugely diverse bioecology that can be grouped into three major types of ecosystems: marine and coastal, land and continental waters. The Moroccan littoral zone features these three types of ecosystems.²⁹⁸

Marine and coastal ecosystems

Coastal lagoon and estuarine ecosystems are generally located in brackish, sheltered environments. These are essential habitats for numerous species that are permanent residents, or which use them for breeding.

Land ecosystems

Forest and steppe ecosystems occupy a broad spectrum of Mediterranean bioclimates, with plant communities that progress from sea level to upper watershed. The communities consist mainly of natural stands of deciduous trees, such as holm oak, cork oak, Pyrenean oak and argan, softwood trees, such as pine, thuja and cedar, and steppes of esparto grass.

Farming ecosystems are subdivided into different agroecological zones: favourable *bour*²⁹⁹ (rainy agricultural zone), intermediate *bour* and unfavourable *bour*.

Continental waters ecosystems

The principal aquatic habitats in the littoral zone are coastal *dayas* (shallow basins where rainwater from neighbouring higher ground temporarily accumulates), dams along the littoral, hot springs, such as the springs at Ain Chaabi, between Al Hoceima and Nador, caves,³⁰⁰ which constitute a particular humid ecotype, lakes and rivers.

²⁹⁸ Fourth National Report on Biodiversity to the CBD.

²⁹⁹ *Bour*: vernacular name relating to a dry cultivation area.

³⁰⁰ Several dozen caves exist in Morocco, some located on the Mediterranean and Atlantic coasts.

Biological description – Diversity of habitats and wealth of resources

Land–sea interface – coastal wetlands

Along the land–sea interface on both coastlines, numerous coastal wetlands offer a complex mosaic of habitats in the form of beaches alternating with escarpments or reef flats, numerous more or less open bays, such as Al Hoceima, Qsar Sghir, Tangier, El Jadida, Agadir, Dakhla and Cintra, more than 300 estuaries and the lagoons at Nador, Smir, Merja Zerga, Sidi Moussa, Oualidia and Khnifiss. Some islets are in the process of breaking away from the coast, the most remarkable being those of Essaouira on the Atlantic and Bades, Leila and Chaffarines on the Mediterranean. In addition to their essential role as spawning grounds for a number of fish species, their resident animal communities represent a high proportion of native species, especially in the waters furthest inland. Situated at the crossroads of several bird migration routes between Europe and Africa, these rich and diverse habitats act as stopover points for millions of migrating birds.³⁰¹

Fisheries resources

The Moroccan coasts are rich in diverse marine resources. In 2015, the Department of Fisheries Resources of the INRH identified 7,825 species, including 7,136 animal species and 689 plant species. This number is certainly an underestimate, given that waters of different origins mix together (e.g., Atlantic, Mediterranean and upwelling), carrying with them the larvae, algae and benthic and pelagic species connected with these masses of water. Despite scientific surveys conducted on the Moroccan coasts, the systematic study of groups has never or only rarely been carried out, even for those that are relatively well studied and are now relatively familiar.

Marine flora is essentially dominated by the algae Rhodophyta (303 species), followed by Pheophyceae (99), Chlorophyceae (87) and Cyanophyceae (12 different forms). In addition to these benthic algae, around 200 species of phytoplankton have been found in the coastal zones of Morocco, distributed mainly along the Atlantic coast. Of the algae, one species (*Gelidium sesquipedale*) is used in the agar-agar industry. The INRH estimated that approximately 154 species of algae present in Morocco could be exploited.

Moroccan marine fauna principally comprises three zoological groups: arthropods, molluscs and vertebrates. This structure is characterized by a great diversity of arthropods, particularly crustaceans, which account for 1,925 species, or 27.16 per cent of the total number of marine species, followed by molluscs, particularly gastropods and bivalve molluscs (1,596 species, 22.54 per cent) and vertebrates, particularly fish (1,145 species, 16.17 per cent). These three taxa represent more than 60 per cent of all marine fauna of the Moroccan coast, the remainder being divided among protozoa (551 species, 7.17 per cent), coelenterates (438 species, 6.14 per cent), lophophores (399 species, 5.63 per cent), annelids, especially polychaeta (351 species, 4.95 per cent) and sponges (303 species, 4.32 per cent).³⁰² The Moroccan maritime domain is also characterized by the passage of numerous migrating species, such as bluefin tuna, and various species of mammals, conferring on Morocco its share of responsibility for managing the international natural heritage.

Yet, as is highlighted by the NBSAP, the current situation of marine biodiversity is of ongoing concern. In addition to the species targeted by traditional fishing and deep-sea fishing, other species are threatened, such as red coral, which is overexploited throughout the Mediterranean off Morocco and in the ocean off Larache, the clam in the bay of Dakhla, the fan mussel, the Mediterranean monk seal, red algae and amphibiotic species such as the Allis shad and the eel.

Bathing water

One hundred and seventy-five geographically distributed beaches were monitored between May and September 2019, with a baseline survey conducted between February and March 2020. With just 79 beaches having been surveyed in 2003, the number of beaches monitored is therefore increasing year on year. Since 2014, the public authorities have been applying Moroccan standard NM 03.7.199, which draws on Directive 2006/7/EC concerning the management of bathing water quality and is based on classifying bathing water and establishing beach profiles. The microbiological parameters measured within the framework of this norm are *Escherichia coli* and intestinal enterococci.

Of the 370 measuring stations affording a sufficient number of samples for classification, just over 12 per cent confirmed the water was unfit for bathing. The

³⁰¹ High Commission for Water, Forestry and the Fight against Desertification, National Wetlands Strategy 2015–2024.

³⁰² INRH, 2014.

results are communicated to managers and users by means of published thematic maps obtained using a geographical information system (GIS)³⁰³ and the Iplages app.

In addition to the national programme on bathing water quality monitoring, the monitoring of the quality of beach sand covered 60 beaches in 2020 and consisted of analyses of mycological indicators likely to have pathological and sanitary effects on tourists, and the typology of marine waste. Plastics and polystyrenes made up 84 percent and therefore the bulk of the waste material recorded, with annual fluctuations linked to numbers visiting the beaches.

Conservation of the coastal cultural and archaeological heritage

The Moroccan littoral represents a social and cultural heritage built on historic social practices, including harvesting and fishing, and on exchanges with the Iberian Peninsula and rest of the Mediterranean. The large majority of the 399 cultural assets, namely sites, monuments and landscapes classed or recorded as national historic monuments, are to be found along the coast.

In 2013, the Cultural Heritage Directorate of the then Ministry of Culture, Youth and Sports published the Strategic Guidelines for Managing and Developing the Moroccan Cultural Heritage for the strategic promotion of the cultural and natural heritage, which involved all public and private stakeholders, all human, cultural and landscape resources and, primarily, local populations, who had to be the primary beneficiaries of the positive impacts of the process to integrate and promote resources. The legal framework governing undersea archaeology is awaiting review, following the initial discoveries in the region of Safi in 2013 and in the face of pressure from human activities.³⁰⁴

UNESCO has designated eight world heritage sites in Morocco, including three in coastal or littoral locations – the Medina of Tétouan, Mazagan (El Jadida) and the Medina of Essaouira (Chapter 7). Prehistoric heritage consists of the quadrant formed by Tata-Akka-Assa in southern Morocco, Neolithic sites and rock carvings on the Oued Eddahab littoral. Remains from the classical period are concentrated on the Tingitan Peninsula and in the Gharb region, at El Berrian, Ad Novas, Msoura Cromlech, Lixus, Zillis and Asilah, and Banassa. In this respect, Morocco

offers considerable variety, including such sites as the Bou Soun cliff cave dwellings and the important Hispanic-Lusitanian and medieval heritage in the Western Mediterranean and on the Atlantic coast.

12.2 Coastal and maritime activities

Exploitation of marine resources

Sea fishing saw annual production levels in 2018 in excess of one million tons (cephalopods, sardines and tuna), placing the country among the leading producers in Africa and 25th in global rankings. Ninety-three percent of this production is provided by 1,780 coastal fishing vessels and more than 16,000 artisanal fishing boats, 5 per cent by the deep-sea fishing fleet that comprises 320 active vessels, and 2 per cent by other activities, such as from algae, aquaculture and coral. Landings take place at 22 fishing ports, eight of which serve artisanal fishing while 14 serve coastal and deep-sea fishing. In addition to these 22 ports, 22 locations are adapted for artisanal fishing in remote areas.

Fishing for small pelagic species occupies an important place in the fishing sector in Morocco. The activity extends along the length of the Moroccan Atlantic and Mediterranean continental shelf and targets key stocks of small pelagic fish. These comprise sardines (*Sardina pilchardus*), mackerel (*Scomber colias*), anchovies (*Engraulis encrasicolus*), horse mackerel (*Trachurus* and *Trachurus trecae*) and sardinella (*Sardinella aurita* and *Sardinella maderensis*).³⁰⁵

Exploitation of these resources accounts for a large proportion of the fisheries potential of the country's exclusive economic zone (EEZ) and takes place in four major fishing areas: Mediterranean (Saadia–Cap Spartel), North Atlantic (Cap Spartel–Cap Cantin), Central Atlantic (Cap Cantin–Cap Boujdour) and South Atlantic (Cap Boujdour–Cap Blanc).

More than one million tons of small pelagic species are fished annually. In 2017, 1.16 million tons of small pelagic fish were landed. The catches are made up mainly of sardines (73 per cent), followed by mackerel (17 per cent) and horse mackerel (7 per cent). Sardinella and anchovy account for just 2 per cent and 1 per cent respectively. The bulk of the catch is landed by coastal seiners (47 per cent) and trawlers with seawater refrigeration (29 per cent).

³⁰³ <https://labo.environnement.gov.ma/>.

³⁰⁴ Moroccan Association for Underwater Archaeological Research and Protection.

³⁰⁵ Department of Fisheries Resources, Moroccan Fish Stock and Fisheries Assessment, 2017.

Photo 12.2: Rabat coast

Photo credit: ECE EPR Team

In geographical terms, the catches come essentially from the South Atlantic area (57 per cent) and the Central Atlantic area (36 per cent). Together these areas possess a large proportion of the small pelagic fisheries potential.

Aquaculture in Morocco has taken off since the 1950s as the result of the launch of shellfish farming in Oualidia Lagoon and experiments with breeding and raising three types of oyster species. Around 10 farms continue to operate in the lagoon today, alongside two purification plants.

Marine aquaculture production in Morocco was established between 2011 and 2014 at an average of approximately 400 tons per year and valued at around 20 million dirhams. In 2018, aquaculture production was estimated to be 600 tons, produced by 21 aquaculture farms. Production centres on oyster farming in Dakhla Bay and Oualidia Lagoon, accounting for an average of 72 per cent of total production, and on European seabass in M'diq Bay (26 per cent). This production is destined mainly for the domestic, hotel and catering markets.

Algae are increasingly used in agrifoods and cosmetics and in agriculture as animal foodstuffs and fertilizers. They now form part of the national aquaculture production landscape in Morocco and are cultivated in Marchica Lagoon to supply the algae-processing industry. In 2018, 14,828 tons of algae worth 56 million dirhams were harvested.

Coastal dredging of aggregates is responding to the growing needs of construction programmes – for housing, road and port infrastructure and urban and tourist developments. Demand was estimated to be 28 million m³ in 2016.³⁰⁶ In addition to exploitation of natural river sand and crushed rock sand, numerous dunes, estuarine and marine quarry sites are located along the Moroccan coasts. To ease pressure on exploitation of coastal dunes in North and Central Morocco, the current policy is to increase extraction of more easily controlled marine aggregates, considering the sensitive areas to be protected, as identified by the INRH, so as not to harm either the essential habitats of fisheries resources or the marine environment balance.

³⁰⁶ Ministry of Equipment, Transport and Logistics, Statement released on the proposed reform of quarry operations, 2013.

A study conducted in 2008 by the Directorate of Ports and the Maritime Public Domain³⁰⁷ highlighted 20 potential areas of accumulated sand in depths ranging from 10 m to 70 m, with 15 sites classed and prioritized as exploitable due to their geographical proximity to areas of consumer demand and to the fact that they involved no dredging operations far offshore.

Seawater desalination in Morocco began almost 50 years ago, initially in the South Mediterranean and Atlantic areas. There are currently eight desalination plants operating, including the one at Al Hoceima, which came onstream in March 2020, and one at Chtouka, which enters service in July 2021. The 2020–2027 Seawater Desalination Development Programme for Morocco envisages adding three new facilities in the Greater Casablanca, Safi and Dakhla regions. The Chtouka plant will act as a pilot for a high added-value project that will combine supplying drinking water to the city of Agadir and irrigating crops in the Chtouka irrigation area. The same experiment is expected to be replicated in Dakhla.³⁰⁸

Other coastal and maritime activities

The country possesses 43 ports, including 14 international commercial ports, 7 passenger ports or marinas and 22 fishing ports. The infrastructure of the port complex consists of 71 km of protection works, 62 km of berthing works, 1,850 ha of sheltered water basin and 1,300 ha of land or platforms, 13 ship repair facilities and 4 maritime stations.

The ports of Tangier Med and Casablanca account for more than half of Moroccan port traffic. Other ports – such as Jorf Lasfar, Safi and Mohammedia – cater for more specialized operations, essentially industrial, oil and gas and solid bulk (such as phosphate).

In 2012, Morocco launched its 2030 National Ports Strategy to develop port hubs with a structural role to play in the country's planning and development and implementation of sectoral strategies. As a result of this strategic document, the maritime transport network has grown considerably, moving Morocco from 84th to 31st place in 2019 for maritime connectivity (UNCTAD indicator).³⁰⁹ The creation of the Tangier Med port, the largest in the Mediterranean,

along with the launch of port works at Nador West Med and Dakhla Atlantic (currently in the design phase) are among the country's most ambitious projects.

Investment projects are also under way to develop the potential of Dakhla, notably in the farming sector. A project to construct a seawater desalination plant, which will provide irrigation for 5,000 ha of agricultural land, is currently in its final phase. The Foug El Oued agricultural development project is under way 20 km south of Laâyoune, in the southern province. This arid settlement is characterized by a saline soil close to 2.8 g/l, which makes farming difficult.

Tourism in Morocco rose steeply in 2019 with 13 million visitors to the country. The Atlantic and Mediterranean coastal areas are where 70 per cent of registered bed capacity, 67 per cent of hotel nights and more than 60 per cent of tourist breaks are concentrated. The four most visited tourist centres are also situated in the coastal area – Agadir and its hinterland, El Jadida–Casablanca–Mohammedia, Rabat–Témara–Skhirat–Bouznika and Tangier–Tétouan.

The growth in coastal tourism has also led to the development of marinas, which are in the process of expanding. The Government's 2020 "Plan Azur" proposes more than 35 sites – 8 Mediterranean and 27 Atlantic – for development of such infrastructure. Launched in 2001, the Plan is designed to strengthen existing and create new infrastructure in line with sustainable development objectives. The flagship project involves creating six seaside resorts at Saïdia, Lixus, Mazagan, Mogador, Taghazout and Plage Blanche. Execution of the Plan appears to be delayed with just two resorts – at Saïdia and Taghazout – being established as of 2020, thus only partially attaining the objectives set.³¹⁰

The role of women in the sustainable development of coastal and marine zones

In coastal zones, as elsewhere in Morocco, women play a vital professional and domestic role. As regards marine produce, they actively participate in collecting

³⁰⁷ Directorate of Ports and the Public Maritime Domain, *Étude de sédimentologie des ports et du littoral marocain. Mission 2 : identification des zones d'accumulation de sables potentiellement exploitables* [Sedimentology Study of Moroccan Ports and Littoral. Mission 2: Identifying Potentially Exploitable Zones of Accumulated Sand]. Final Report No. 17124436-M2R1, 2008.

³⁰⁸ Interview with Mr Omar Benjelloun, Research and Planning Director at the then Ministry of Equipment, Transport, Logistics and Water, *Le 360 Magazine*, 24 November 2020.

³⁰⁹ <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=13321>.

³¹⁰ Economic, Social, and Environmental Council, 2018.

certain species, such as algae and shellfish, and in processing and marketing many fish catches. For example, alongside the divers at Sidi Bouzid beach, dozens of women and their children are continuously collecting algae thrown up by the sea. Women are also employed in various activities linked to sea produce, including freezing and conserving, particularly sardines. Women also form an integral part of artisanal fishing and fishing communities, as workers, entrepreneurs or members of fishing families. However, their contribution is not always recognized for its proper value, and their work and their role often remain invisible.³¹¹

The second Government Plan for Equality (Joint Initiative to Consolidate the Gains of Moroccan Women) for the period 2017–2021 focused particularly on promoting and protecting conditions for women through a range of measures: promoting women's rights and establishing the principle of equality, creating and promoting an equity body, fighting all forms of discrimination and launching a national policy to eliminate violence against women. The second Plan thus contains measure 1.3.3 on strengthening the position of women in the value chains of agriculture, fish farming and the extractive and artisan sectors. If implemented, this measure would help Morocco achieve SDG 5.

Furthermore, women and girls in both rural and urban coastal settings are increasingly making their voices heard in the fields of civic and voluntary organizations, production, research and innovation, and management, in order to increase their autonomy and improve their workplace conditions. As some projects have demonstrated, women's place in rural societies, particularly on the coast, is not valued. For example, the FAO-ArtFiMed project, implemented as part of the FAO-CopeMed II project,³¹² was aimed at, among other things, strengthening the role of artisanal fishing in rural development and strengthening the role of women in fishing. Other projects that emerged as part of the social component of the Strategy Halieutis were aimed at improving the working and living conditions of sea fishers and highlighting the value of work done by women.

12.3 Anthropogenic pressures

Morocco does not yet measure the indicator for coastal eutrophication potential and floating plastic debris that would enable it to assess progress towards attainment of SDG target 14.1. The same applies to SDG target

14.3, as the average acidity (pH) of the seas is not measured. However, Morocco is taking action to remedy pollution.

Converging pressures and cumulative impacts

Positioned at the land–sea interface, the littoral is the point at which multiple pressures converge, resulting in cumulative impacts on the same ecosystem, or socioecological system if local populations are included. These pressures come equally from the sea, from the maritime activities described above, namely fishing, port operations and maritime transport, and marine aggregate extraction, and from the land, from the lower to the upper reaches of the watershed area and encompassing forestry, agriculture, industry, tourism, sand extraction and seawater desalination. Added to this is demographic pressure, with the growth of towns and cities and the construction of infrastructure, such as piers and jetties, marinas and buildings, which disturb the natural system and create or exacerbate the phenomena of coastal erosion. The most vulnerable zones are therefore those where all such activities and resident populations are concentrated – Kenitra–El Jadida, Tangier–Tétouan, Agadir and Marchica Nador.³¹³

Land-based pollution

Urbanization is exerting pressure on the coastal zones in Morocco. This applies to the country's most important urban agglomerations in the north-west, which possess 61 per cent of large city populations and 80 per cent of people working in industry, and an urbanization rate that increased from 8 per cent at the beginning of last century to almost 60 per cent in 2015. These regions represent a significant centre for tourism, not to mention industrial and commercial activities, thereby generating considerable volumes of wastewater, industrial effluent and all types of macro-waste.

River inputs and sediment deficits

Rivers carry huge volumes of freshwater and sediments towards the sea. This process is increasingly disrupted by dams installed essentially in the littoral zone. The functioning of this hydraulic infrastructure has extensively altered the quantity and quality of the sediments released upstream and thus downstream towards the coast and the marine environment. This sediment deficit, combined with other natural factors, results in erosion phenomena that vary according to

³¹¹ International Trade Centre: Roadmap – Marine Products Sector.

³¹² www.faocopemed.org/.

³¹³ Third National Report on the State of the Environment in Morocco, 2015.

the different types of coast. Along coasts with cliffs, the process is continuous and irreversible, especially with the general rise in water levels, as is the case between Jorf Lasfar and Oualidia, at the cliff in Safi, the sandstone cliffs at Sidi Moussa–Bouknadel and the cliffs of the Bokoya massif to the west of Al Hoceima. Sandy zones are particularly affected by this deficit: according to a study in 2010,³¹⁴ two thirds of Moroccan beaches suffer from erosion.

Air emissions

Port cities in Morocco are subject to particularly high levels of air pollution due to industrialization and vehicle traffic. In cities with a very high concentration of industry, such as Casablanca, environmental epidemiology studies have confirmed the negative impacts of air pollution on human health.³¹⁵ Monitoring networks remain underdeveloped, however, apart from in Casablanca, where daily forecasts are made available to the public.

Waste from farming inputs and household and industrial wastewater

The principal sources of pollution of coastal waters are agriculture and household and industrial wastewater run-off, resulting principally in the input of suspended organic and mineral matter, inorganic nutrients, which cause eutrophication (additional loads of N and P) and xenobiotic substances, which have a toxic effect on natural ecosystems.³¹⁶ These effects are particularly pronounced in certain habitats, such as the lagoon complex at Oualidia Sidi Moussa, where greenhouse cultivation of tomatoes has affected the lagoon waters. The same applies to the lagoons at Moulay Bouselham and Khnifiss, and other lagoons where agriculture exists in close proximity to these habitats and where pastoralism inevitably has an impact on the environment.

In the case of household wastewater, 56 per cent was treated in 2020 as opposed to 8 per cent in 2005, the year the PNAM was launched. Along the Moroccan coast, there were 152 WWTPs that have been built (including outfalls) and 76 are under construction. The volume of raw wastewater generated in the coastal zone would rise from 76 million m³/year in 2011 to 123 million m³/year in 2030, an increase of more than 61 per cent, making this discharge one of the major problems in terms of coastal water quality.³¹⁷

The bulk of polluting heavy industrial and other economic activities is also concentrated in the Moroccan coastal zone. The Fourth National SOER in Morocco estimated that, in 2020, over 50 per cent of industrial wastewater in Morocco was discharged into the sea. The Kenitra–Safi stretch was the focus of more than 80 per cent of industrial effluent in Morocco. The coastal regions surrounding the major ports of Casablanca–Mohammedia, Tangier Med, Safi and Nador are subject to the highest levels of industrial effluent – water for cooling and washing raw materials, effluent from manufacturing processes, such as phosphogypsum, and amurca (lees) from olive oil mills.

The discharge of untreated household and/or industrial wastewater into receiving environments generally causes a range of problems³¹⁸ relating to public health, the living conditions of the population, water resources, degradation of flora and fauna and bathing water quality.

Physical degradation

The littoral is suffering physical degradation, including coastal erosion and instability, dune destruction and salination of the coastal aquifers. According to a study of coastal erosion in Morocco,³¹⁹ around two thirds of the country's beaches are suffering erosion, with the rocky coasts expanding at the expense of the sandy coasts. On the Mediterranean,

³¹⁴ A. Laouina, *Littoral marocain et changement climatique. Programme d'études « Changement climatique : impacts sur le Maroc et options d'adaptation globales »* [Moroccan Littoral and Climate Change. Studies Programme on Climate Change: Impact on Morocco and Options for Global Adaptation]. Report by IRÉS, 2010.

³¹⁵ "Pollution de l'air : 10 milliards de DH par an, le coût de l'inaction" [Air Pollution: 10 billion Dirhams Per Year, the Cost of Inaction]. *Challenge*, 2019. www.challenge.ma/pollution-de-lair-10-milliards-de-dh-par-an-le-cout-de-linaction-124338/.

³¹⁶ www.researchgate.net/publication/280946295_agriculture_in_coastal_areas_environmental_issues_impacts_and_regulation_tools.

³¹⁷ Strategic Study of the Reuse of Treated Wastewater Discharged into the Sea, Directorate of Water Research and Planning, 2012.

³¹⁸ European Environment Agency, *Horizon 2020 Mediterranean Report*. Annex 4: Morocco. Technical Report No.6/2014. 2014. www.eea.europa.eu/publications/horizon-2020-mediterranean-report.

³¹⁹ M. Mansoum, "La gestion de l'érosion côtière au Maroc. Les littoraux marocains : changement climatique et stratégies de gestion" [Managing coastal erosion in Morocco : The Moroccan littoral: Climate change and management strategies], *Paysages géographiques*, No. 2, 2016.

the beaches most affected are those in Tangier Bay, Saïdia beach, the beaches at Al Hoceima and Fnideq, and the coast between Tétouan and Ceuta. On the Atlantic, the zones suffering the greatest impact are Agadir Bay, the beaches of Essaouira, El Jadida, Casablanca, east Mohammedia, and Sidi Abderrahim at Larache. *Wadi* mouths – normally areas where sediments accumulate – are retreating in many locations, including those at Moulouya and Souss, where the rate exceeds 5 m per year. Dams on the *wadis* and sand extraction on the coast and deltas have considerably altered the sedimentary dynamics in these areas. More specifically, in 2016, illegal extraction of sand from shorefront dunes and beaches represented in excess of 50 per cent of sand needs.

Pressures on the littoral are also leading to the progressive salination of freshwater aquifers. The development of intensive irrigation for agriculture and the installation of huge urban and tourist infrastructure are resulting in excessive amounts of water being removed and the salination of a growing number of the coastal aquifers in Morocco.

Maritime transport

The International Maritime Organization estimated that, in 2012, global CO₂ emissions from maritime transport were equivalent to 2.2 per cent of global emissions from human activities. It expected these levels to increase by 50–250 per cent by 2050 if no measures were taken. In addition to air pollution, the environmental impact of maritime transport relates to ballast water discharge, noise pollution, collisions with marine mammals and oil spills, both accidental and deliberate, such as illegal tank cleaning at sea.

Morocco imports more than 95 per cent of its oil requirements, and the volume of hydrocarbons being handled by its commercial ports is on the rise. Given the magnitude of traffic heading for and passing by the ports sited on the Moroccan coast, accidental pollution is considered a potential risk, which has materialized many times.³²⁰ One of the most recent incidents, which took place in 1990, was the collision between the oil tanker *Sea Spirit* and the Norwegian methane tanker *Hesperus*, which released 9,860 tons of oil into the seas off Gibraltar.³²¹ The spill occurred near Cap Spartel and formed a sizable hydrocarbon slick which, as a result of the currents and winds, passed through the Straits of Gibraltar before breaking up and heading for the bays of Al Hoceima and Malaga. The impact on fishing, and particularly on tourism, was felt immediately.

On the Atlantic coast, the port of Mohammedia is the leading reception point for hydrocarbon handling, followed by the port of Jorf Lasfar, making this an area at risk. On the Mediterranean coasts, the activities of the new Tangier Med port have led to an increase in maritime shipping. This is over and above almost 300 ships that pass through the Straits of Gibraltar daily and which account for one third of the annual global total of oil transportation.

Seabed degradation

Trawling affects the environment both directly and indirectly. The direct effects comprise the dragging and disturbance of the substrata by trawlers, sediment resuspension, benthos destruction and discharge of processing waste. The indirect effects include marine species mortality and the long-term changes brought about by benthic trawling.

Information on the impact of trawlers operating on the Atlantic coast remains scarce, if not non-existent. In the Mediterranean, trawling is prohibited in the three-mile coastal strip along the Atlantic coast. Since 2015, a decree has set out the non-trawlable areas along the Mediterranean coast. In addition, other areas have been banned from trawling in application of INRH recommendations, particularly in certain sensitive areas and habitats (areas designated for the protection of marine mammals, spawning and recruitment areas and rocky areas). The damage caused by so-called ghost fishing, involving abandoned, lost or discarded fishing gear, should also be noted. Although no data exist for Moroccan waters, FAO estimates that these waters represent 10 per cent of global marine debris.

Overexploitation of marine resources

The diagnosis of exploitation levels by 2019 confirmed the state of overexploitation of sardine stocks in the Mediterranean and mackerel in the North and Central Atlantic areas, swordfish in the Mediterranean, shrimp and hake stocks. However, the central and southern sardine stocks, the most important small pelagic stocks, are fully exploited, and the anchovy stock is not fully exploited. According to the INRH, the increasing trend in catches of these resources in recent years and the diagnosis of the amounts landed in some areas call for vigilance regarding the level of fishing pressure on these stocks. As regards the state of octopus stocks in the south, the fluctuations in abundance observed indicate that this stock has not yet recovered its optimal situation and remains in a fragile state of equilibrium. The shrimp

³²⁰ Third National Report on the State of the Environment in Morocco, 2015.

³²¹ wwz.cedre.fr/en/Resources/Spills/Spills/Sea-Spirit-Hesperus

and hake stocks remain overexploited despite the management measures implemented.

According to field studies conducted by the INRH in 2017, officially declared figures are considered an underestimate, given that the majority of fishing units do not declare their catches at some of the ports and fish landing sites. Marine surveillance is carried out by the Royal Navy and the Royal Gendarmerie, and 18 Moroccan fisheries delegations carry out inspections at ports and, periodically, at landing sites in Morocco.

Morocco does not measure the proportion of fish stocks with a biologically viable level, and so information is not available relating directly to SDG target 14.4 as it appears in the 2020 VNR. However, to fill in SDG target 14.4, Morocco has set up the indicator “Proportion of fish stocks caught/targeted that are managed sustainably”, which makes it possible to measure the achievement of the target. However, the degree to which some of the measures set out in the NBSAP have been applied reveals the efforts that have been made to achieve this target. In the area of governance, these measures comprise the development of an integrated information system for fisheries resources and increased inspection and monitoring of fishing activities. Rationalizing exploitation has seen the introduction of management measures based on scientific advice, the development of planning and measures for managing the species

caught and reduced fishing in the most sensitive areas, such as wetlands. Lastly, in the field of knowledge, the provisions of Law No. 22-07 governing the development of MPAs and the fisheries within them have been strengthened.

Invasive exotic species

As regards marine biodiversity, the primary causes of the arrival and establishment of new, invasive species include trade and, more especially, maritime shipping, in the form of ballast water and hull fouling. As well as species introduced by maritime shipping, another cause in the specific case of the Mediterranean is the arrival of species from the Red Sea along the Suez Canal. Although Morocco is situated at some distance from this source, species which successfully adapt to their new Mediterranean habitat have been observed to migrate over time from the eastern to western basins of the Mediterranean (Chapter 11).

Loss of biodiversity

As the NBSAP emphasizes, interaction among these combined pressures explains the current situation for species and spaces in Morocco. In the case of the coastal zone, one of the principal factors directly threatening biodiversity comes from growing urbanization and other human activities along the coast and littoral.

Photo 12.3: Naila Lagoon



Photo credit: Department of Sustainable Development

12.4 Climate change

The Moroccan coasts are affected by climate change, particularly as regards rising sea levels and major biogeochemical changes. These have an impact on environmental biodiversity and biological productivity in several ways. The observations of the DGM reveal a rise in temperature, a decline in precipitation and increasing periods of drought, worsening the gap between water supply and demand. According to estimates, average temperatures will increase by between 2°C and 5°C by the end of the 21st century, while precipitation will decline by 20–30 per cent.

Impact of climate change

The Moroccan coasts, including the lagoons at Nador and Sidi Moussa, the Sebou estuary and the cities of Casablanca, Mohammedia, Agadir and Tangier, have been identified as being among the most vulnerable coastal systems to rising sea levels brought about by climate change, which could cause storm surges and coastal flooding in particular. Some zones on the north coast are already being eroded at a rate of 1 m per year and the average global sea-level rise forecast by the Intergovernmental Panel on Climate Change (IPCC) would worsen the erosion of the aforementioned sites. If the sea level rises by 1 m by 2100, combined with special weather conditions, this could affect cities such as Dakhla, Tarfaya, Larache, Fnideq, Martil, M'diq, Essaouira and Agadir.

The First Mediterranean Assessment Report (MAR1), entitled “Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future”, by the network of Mediterranean Experts on Climate and Environmental Change,³²² particularly emphasizes that:

- The Mediterranean Basin is one of the most prominent hotspots for climate change;
- The rise in sea level could exceed 1 m by 2100;
- The availability of freshwater will probably reduce by 15 per cent over the next decades;
- Seawater acidification and temperature rises, combined with marine overexploitation, have already led to a 41 per cent loss in principal predators, including marine mammals;

- The rise in water temperature, combined with other destabilizing factors, is contributing to and escalating the incidence of invasive swarms of jellyfish;
- Saltwater flooding and intrusion will affect the precarious balance of coastal wetlands;
- The risks of coastal flooding and storm damage are increasing, threatening land-based infrastructure.

No sector, including fishing, is spared from the effects of this global phenomenon observed in Morocco. Indeed, Morocco is now one of the most vulnerable countries in terms of the impact on and vulnerability of the fishing sector,³²³ and is ranked 11th of 133 countries on a vulnerability index, according to a recent study by Worldfish.³²⁴ The factors behind this vulnerability include the huge dependence of some coastal populations on fishing, the importance of the upwelling zones along the Atlantic coast and the limited economic resources of the stakeholders concerned, which hampers the investment needed for any adaptation effort.

Field studies conducted by the World Bank in 2013 involving 463 artisanal, coastal and deep-sea fishers showed that Moroccan fishers have already begun to notice the impact on their fishing practices of the effects that might be expected from climate change, such as the shift in the timing of the reproduction period, the disappearance of some species, the reduction in the number of fishing days following an increase in storms and floods, and the decline in stocks which had until recently been abundant.

Adaptation measures

Since the Rio Declaration on Environment and Development in 1992, Morocco has progressively committed to environmental transition for sustainable development. The notion of sustainability has been integrated at the highest legislative level in the form of the 2011 Constitution and the 2014 Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development.

The National Plan against Global Warming was launched in 2009 and was replaced by the PCN. The PCN was developed in 2016 to improve coordination of the country's actions and maximize their impact on

³²² www.medecc.org/first-mediterranean-assessment-report-mar1/.

³²³ World Bank, Middle East and North Africa Sustainable Development Department, Climate Change and Fisheries: Impacts and Recommendations. Program of Analytical Support for the Climate Change Strategy in Morocco, P-ESW 113768 Strategic Note No. 3, December 2013.

³²⁴ E. H. Allison and others, “Vulnerability of national economies to the impacts of climate change on fisheries”, *Fish and Fisheries*, 2009.

adaptation of water resources, fishing, agroforestry, health, biodiversity conservation, tourism, urban development and land-use planning. In 2020, studies began into producing seven regional climate plans, including for the coastal regions of Tangier-Tétouan-Al Hoceima and the east of Morocco.

In accordance with article 44 of the Law No. 81-12 relating to the coast which provides for the adaptation to the risks linked to climate change and the sustainable management of the coast, the PNL has focused on improving the resilience and adaptive capacity of the coastline to climatic hazards and natural and anthropogenic risks. adaptation, especially to sea level rise.

In addition, in order to consolidate adaptation activities that are already under way in the fishing sector, Morocco has set itself five objectives as part of developing a climate change strategy:³²⁵

1. To improve prevention by strengthening the precautionary approach, ecosystemic approach and integrated and adaptive strategy for managing fishing;
2. To increase research efforts, particularly with a view to distinguishing “definite” and “likely” impacts;
3. To confirm the observations reported in this study by monitoring in order to verify scientifically what has until now been based on anecdotal evidence;
4. To strengthen the national strategy on ICZM;
5. To develop a participative framework for drawing up a sustainability strategy to which all stakeholders will be invited to contribute, in order to secure wider support and greater participation.

12.5 Legal, policy, institutional and financial framework

Legal framework

Two fundamental laws establish the territorial waters and EEZ in accordance with the international legal framework in the form of the United Nations Convention on the Law of the Sea (Montego Bay Convention), ratified by Morocco in 2007. These laws confirm and clarify the earlier laws of 1973 and 1981 that established the maritime space over which Morocco exercises sovereignty in compliance with international law and which provide the means to settle any legal disputes over maritime borders.

Law No. 37-17 sets out the 12-mile territorial limit of the maritime waters over which Morocco exercises full sovereignty, including the right to construct and protect pipelines, cables and navigational equipment, conduct research and take environmental protection measures. All the country’s laws, and particularly those concerning customs control, taxation, health and immigration, are enforced in this space.

Law No. 38-17 establishes the EEZ, which extends for more than 200 miles from the Moroccan coast and from the outer limits of its continental shelf to a distance of 350 miles from the country’s coast. Within this area, Morocco has the right to explore and exploit non-biological resources on and below the sea floor. In practice, while this space can be applied to Atlantic waters, the same is not true of the Mediterranean waters, where it is necessarily reduced.

The 2015 Law No. 81-12 on the Coastal Zone establishes the fundamental principles and rules of sustainable integrated management of the coast with a view to its protection, enhancement and conservation. Divided into 10 chapters and 56 articles, it establishes integrated management of the coast, rigorously protecting it while taking account of the demands for local development and the well-being of populations. Its objectives include limiting construction of new developments close to the shore, in the form of a ban on construction along a 100 m strip, minimizing any form of polluting discharge and encouraging scientific research and innovation. It requires a national coastal plan and regional schemes on the coastal areas to be created that take account of the local, environmental, social and economic specificities of the coast. Its first objective is the protection of the balance of coastal ecological systems, biological diversity and the preservation of natural and cultural heritage.

The 2010 Law No. 22-07 on Protected Areas allowed for the creation of MPAs by setting out the legal provisions for their planning and management. The categories of protected areas adopted broadly reflect the 1996 classifications of SBEIs but with amendments to their legal status. This reshaping of the legal framework moves towards making administrations, local authorities and the populations concerned part of the process of creating and managing protected areas and involving them in the sustainable development of these spaces. In 2020, SDG target 14.5 had not been met. MPAs covered just 0.69 per cent of the total marine surface area.

³²⁵ World Bank Middle East and North Africa Sustainable Development Department, Climate Change and Fisheries: Impacts and Recommendations. Program of Analytical Support for the Climate Change Strategy in Morocco, P-ESW 113768 Strategic Note No. 3, December 2013.

However, protected areas did cover 43.32 per cent of the surface area of key marine biodiversity sites.

The 2015 Law No. 27-13 on Quarries classifies dragging for marine deposits as undersea quarrying but does not contain provisions that could potentially protect the environment, notably from the physicochemical, ecological and biological effects of marine sand-dredging activities.

The fundamental legal texts on which fishing regulations are based comprise the 1919 Maritime Trade Code and the dahir containing Law No. 1-73-255 of 1973, as amended and supplemented. Many other laws, decrees and rulings deal with navigation conditions, aquaculture, fishing industry activities, marketing marine produce and shipbuilding and repair. Bill No. 75-18 amending and supplementing Law No. 1-73-255 of 23 November 1973, which established marine fishing regulations, defines the terms of recreational fishing which, with the rest of fishing activities, come under the jurisdiction of the Department of Marine Fisheries. This bill has not yet been adopted. Law No. 22-80, enacted by Dahir No. 1-80-341 of 1980 then revised by Dahir No. 6-06-102 in 2006, deals with the country's cultural heritage. This Law does not determine, however, the way in which the cultural heritage should contribute to the development of society and makes no particular provision for sites and monuments that have not been classified.³²⁶

According to the strategic assessment of the Moroccan maritime transport sector and the development of the national fleet in Morocco, commissioned by the Merchant Marine Directorate of the then Ministry of Equipment and Transport in 2013, the legislation relating to maritime transport is sparse, outdated, ill-suited to the development of the sector and, to a large extent, dictated by the international context. In practice, the coast's relationship with the sector is conducted of necessity through port policy and the National Ports Agency, as discussed below.

Policy framework

National Sustainable Development Strategy

Integrated coastal zone management (ICZM) cuts across seven priority areas set out in the SNDD, namely, governance, transition to a green and blue economy, enhancing the potential of natural resources and conserving biodiversity, combating/adapting to climate change, sensitive zones (coastal wetlands),

human development and social and land inequalities, and developing knowledge.

National Strategy of Natural Disaster Risk Management

The National Strategy of Natural Disaster Risk Management (2020–2030) is aimed at protecting the lives and assets of Moroccan citizens from the effects of natural disasters, reducing vulnerability to the risks posed by such disasters and strengthening the capacity of the population and the provinces to withstand these in order to ensure the country's sustainable development. The Strategy covers four types of natural disaster: tsunami, soil erosion, earthquake and flood. It establishes three strategic objectives:

1. To improve knowledge and assessment of the risks;
2. To strengthen risk prevention by increasing resilience;
3. To improve disaster preparedness to ensure a rapid response and efficient reconstruction.

Strategy Halieutis

In 2009, the Department of Marine Fisheries of the then Ministry of Agriculture and Marine Fisheries launched the Strategy Halieutis, a growth and competitiveness strategy for the period to 2020, to help develop a high added-value, sustainable blue economy. The Economic, Social and Environmental Council defines the blue economy as all activities, both commercial (fishing, aquaculture, port operations, shipbuilding and repair, energy, marine biotech and seawater desalination) and non-commercial (research, observation and monitoring, education and training, culture, heritage conservation and restoration, safety and security) related to the ocean, seas and coasts. This new blue economy model is emerging in Morocco in the context of international partnerships generated and implemented as a result of various blue economy activities within the Mediterranean basin, the European Union and Africa. There are five pillars to the Strategy Halieutis: establish quotas for all fisheries; develop aquaculture and shellfish farming; create fishing port infrastructure and facilities; systematically add value to catches once landed; and establish inspection and control on land and at sea. The Plan was designed to be implemented via 16 strategic projects, including three with a major environmental impact in terms of scientific knowledge, quotas and fishing effort. As part of the Plan's sustainability component, the Department of

³²⁶ Coastal Development Programme-Morocco (PAC-Maroc), "Historic Cultural Heritage of the Central Rif", Final Report, 2012.

Marine Fisheries launched three pilot projects for MPAs designated for fishing in Morocco.

The implementation of the Strategy Halieutis appears to have helped Morocco attain SDG target 14.2. However, the 2018 annual report of the Court of Auditors noted that some strategic objectives had not yet produced the expected results. In the case of fishing, 300 species are registered as commercial species, while the INRH monitors just 60 species. The stocks of more than 15 species are exploited beyond their maximum sustainable yield, particularly in the case of high added-value species such as swordfish, blackspot seabream, meagre and rose shrimp. Some stocks of great commercial importance have seen their indicators improve thanks to the measures taken (e.g., sardines – although they are still overexploited – and octopus); other stocks, such as shrimp and hake, are still overexploited and require a review of the measures taken.

Other lesser-value species, such as the sardine in the Mediterranean and sardinella, have also been overfished since 2015. There are no regulations for small tuna, which make up more than 50 per cent of the total weight of large pelagic fish landed nationally. The bluefin tuna is managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT), of which Morocco is a member, according to a multi-annual management plan for this species. In addition, the amounts of the licence fees are being revised.

Ports strategy

Handling 95 per cent of the external trade of Morocco, the country's ports represent a vital economic sector but one which has an impact on the coastal area, in the forms of erosion as a result of port infrastructure and of pollution from shipping and industry. The 2030 National Ports Strategy sets out a vision of a new port landscape based on ambitious growth loosely allied to regional development and environmental policies centring on seven strategic areas. The Strategy is aimed at integrating environmental and urban objectives from the design phase of investment projects (Strategic Area 6).

Adopted in 2016, the blueprint for developing port facilities for the shipbuilding industry by 2030 is designed to equip Morocco with modern port infrastructure to drive expansion in its shipbuilding industry and to secure the country's position in this sector at the regional level. The shipbuilding and refit activities covered by the plan offer valuable potential for growth at a national level, including in

shipbuilding, repair and maintenance, ship dismantling and construction of offshore platforms.

The aim of the Ibharr programme, launched in 2008 and renewed in 2011, is to upgrade and modernize the Moroccan coastal and artisanal fleets by improving existing vessels and introducing new ones.

The satellite system for locating and tracking fishing boats was introduced in 2011. It was accompanied by an initial purchase of 1,500 vessel tracking devices (VTDs), followed by a further purchase of 750 VTDs in 2012. Vessel tracking enables checks to be made as to whether vessels are complying with existing regulations governing fishing activities and controlled and protected areas.

In the context of the Sustainable Fisheries Partnership Agreement between the European Union and Morocco, the 2014–2018 Protocol set out economic and sustainability objectives. Various projects were instigated for the economic development of the sector while ensuring its sustainability, including creating a new generation of fish markets to optimize the capacity and management of fishing ports.

National Integrated Coastal Zone Management Plan

The PNL was drawn up in line with the provisions of Law No. 81-12. It was adopted by the Government Council on 5 May 2022 and the decree of its approval was published in the official bulletin on 2 June 2022. The ambitious, integrative plan is aimed at ensuring a balance between development and conservation for coastal sustainability by adopting a holistic, integrated approach to development and a coordinated model for managing spaces and resources. This approach takes account of environmental, socioeconomic, cultural and institutional factors, thereby ensuring the long-term future of the multiple roles played by the coastal area and improving its resilience and capacity to adapt in the face of climate uncertainties and coastal risks.

The PNL provides a framework for the new ICZM policy established for the entire Moroccan coastline and maritime space and involves all ICZM and marine spatial planning (MSP) stakeholders. The PNL is based on six strategic areas. The first area focuses on establishing a coastal governance framework. This institutional, legislative, regulatory and financial framework is designed to ensure that the measures for developing the Moroccan coast are effective, while safeguarding the structure and functioning of coastal and marine ecosystems. The SRLs have a fundamental role to play in integrating and linking all cross-cutting and sectoral policies. How effectively the schemes are

implemented will depend, in particular, on how legally enforceable they are with regard to other documents, including those dealing with urban development. The PNL also aims to strengthen regional and international cooperation and public participation. A pilot project to develop an ICZM scheme for the Rabat-Salé-Kenitra Region is under way and will serve as a model for other coastal regions (box 12.1).

The second area focuses on effectively coordinating territorial planning instruments and the principles of ICZM to improve land and sea spatial management by integrating climate risks and by considering the specific vulnerabilities of each region within its own planning and development scheme. Such coordination could lead to the creation of instruments for integrated land-use planning. In advance of the upcoming publication of a cartographic atlas of the coast, and as the diagnostic work in preparation for the Rabat-Salé-Kenitra SRL has shown, regulations relating to the planning, development and occupation of the coastal and marine space of the littoral constitute the core of legal principles for laws relating to the coastal margin. The PNL–SRL coupling aims to bring coherence to the planning and development instruments of territories that include coastal areas, as well as investment programmes.

The third area centres on protecting and preserving the coastal ecosystem and preventing degradation. This involves optimizing the use of coastal spaces by mitigating the potential negative and cumulative impacts. This means taking account of carrying capacity and reducing all forms of pollution that jeopardize water quality, habitats and species as well as fisheries resources. It also requires a consistent, joined-up approach to implementing the many sectoral policies and strategies – including, first and foremost, those governing water – within a given space, from watershed to coastal and marine environments, which include the PNAM, PNDM and National Watershed Management Plan. This area also contributes to achieving SDG targets 14.1 and 14.2.

The primary goal of the fourth area is to improve the socioeconomic development of the littoral and to promote the blue economy by enhancing its economic potential, while preserving its environmental and cultural potential, and by increasing social cohesion. This area can rely on the 2015 Strategy for the Protection and Development of the PMD and its master plan for developing the PMD up to 2035.³²⁷ The ambition is to produce a roadmap for the integrated development of all sectors of the blue economy.

Box 12.1: Regional coastal scheme for the Rabat-Salé-Kenitra Region

The current ICZM pilot project to develop an initial scheme for the Rabat-Salé-Kenitra Region and its 30 communes will be a rich learning experience in terms of the legal and institutional process and how it is implemented at commune level. Despite the responsibilities for managing the beaches and coastline assigned to the communes by the Communal Charter, they continue to be little involved in major littoral and coastal wetland planning and development projects. * The intention of the project is to finalize and consolidate the legal mechanism, including the legislative and regulatory framework, of the public maritime domain (PMD) and the institutional arrangements, by setting up regional and territorial bodies responsible for coastal governance. For these bodies, this involves specifying:

- The mandate and tasks of the Regional Commission on Integrated Coastal Zone Management and the prerogatives of the regions in the management of the PMD;
- The funding, by providing a budget heading devoted to coastal and maritime spaces in the budgets of the various bodies concerned and by encouraging commitments from the private sector;
- The development of the maritime sector's contribution to the economy by coordinating all sea-based activities and producing an additional MSP document as part of expanding the blue economy.

This approach contributes to achieving SDG target 16.7 as part of ICZM.

Resolving these governance issues is aimed at achieving the sustainable development of the coastal regions through the work of the National Commission on Integrated Coastal Zone Management and the Regional Commissions, which are the consultative bodies for all coastal authorities and actors who come under the authority of the Department of Sustainable Development at the national level and the governor or *wali* of the region concerned.

* M. Mansour, R. Alillouch, L. El Ghazouani and H. Inaa Yaya Aissatou. *Le littoral : instruments, acteurs et articulations avec le système de planification urbaine et territoriale*. (Ecole nationale d'architecture de Rabat, 2018).

³²⁷ www.equipement.gov.ma/ports/Strategie/Pages/Strategie-Domaine-Public-Maritime.aspx;
<https://congres2015.umgeometres.com/asset/conferences/conf3-5.pdf>

The fifth area focuses on improving knowledge to guide the decision-making involved in achieving the sustainable development of the littoral. It relies on encouraging the production of knowledge and the sharing of relevant, up-to-date data in order to inform citizens and elected representatives and increase their commitment to and participation in policy implementation. This approach will aid Morocco in its efforts to achieve SDG target 14.a.

Finally, the sixth area seeks to mobilize and strengthen the capacities of the stakeholders concerned with a view to fulfilling their roles in the protection and enhancement of the coastline, consolidating the role of civil society, as a development partner, in the protection and enhancement of the coastline and by raising the awareness of and informing all citizens about the environmental and cultural values of the coastline and the imperative of safeguarding them. For example, this area is one of the major components of the ICZM project for the Oriental region.

A large number of workshops and training sessions have been organized locally and centrally for decision-makers, managers and users as part of the ICZM and integrated water resources management (IWRM) approaches and as a way of involving them in local development planning (through a Neighbourhood Action Plan for six communes). The socioeconomic impact assessment report for the project notes that the beneficiaries of this training expressed their satisfaction at the various types of training received but indicated that they continued to make minimal use of the knowledge acquired during the exercise.

As indicated in the draft decree, the principal indicators for monitoring the components and strategic objectives of the PNL do not automatically encompass each of the objectives, given that information for some indicators, such as for Strategic Objective 5 (SO5) on strengthening the participative process, can be provided using qualitative data based on surveys, for example. Furthermore, these indicators would be more useful if linked to all SDGs and relevant targets and not just to SDG 14.

The first SRL for the Rabat-Salé-Kenitra region offers a more detailed template of performance indicators for SRL implementation, although, in terms of governance, it does not refer to SO5, despite this being a key factor in successfully implementing the SRL.

The littoral in other strategies

The National Land-use Planning Scheme (SNAT) of Morocco campaigns for a watershed and coastal zone continuum by highlighting their interconnected, complementary nature. The regional land-use planning schemes (SRATs) for coastal regions must include a component devoted to the littoral that aligns with future SRLs. The legal provisions for how the PNL and SRLs are to interact, on the one hand, and how they must relate to the SRATs and Master Plan for Urban Planning (SDAU), on the other, still need to be clarified.³²⁸

The PCN comprises five pillars. Pillar 2 on increasing climate risk resilience focuses on the littoral and wetlands and at conserving and adapting fisheries resources. It designates the fishing sector as vulnerable to climate change. Among the measures recommended is the development of a national plan for coastal risk management and adaptation to climate change. The main areas of this plan must be taken into account in future SRLs.

The NBSAP features four pivotal components that place emphasis on the watershed and coastal zone continuum, with action outlined for the forestry, farming and maritime sectors and all linked to climate change. It should be possible to apply it more effectively to the littoral – coastal and marine biodiversity – as a result of the integrated framework afforded by legislation on the littoral, the PNL and future SRLs. The 40 SBEIs on the Moroccan coast essentially comprise bays, cliffs, lagoons and *wadi* mouths, that is to say, coastal wetlands with exceptionally rich and diverse flora and fauna that are also seriously endangered. For this reason, and in the absence of a specific legal framework, the National Wetlands Strategy 2015–2024 has been adopted to clarify the NBSAP for these quite specific environments.

The 2008 plan of Morocco to secure sand supplies, particularly the section relating to opening up contracts for offshore sand-dredging, does not appear to have a sufficiently robust legislative framework for the technical and environmental management of marine sand extraction processes. There is the risk that the pressures experienced by coastal deposits are simply transferred to underwater deposits, given that they all belong to the same sedimentary prism in which the changes in one are linked to those in another. The plan is based on production by 2016 of 16 million m³ from marine dredging as against just 10

³²⁸ J. Barbier and others, “Système de planification urbaine” [Urban Planning System], CREADH; MATUHPV-DU, 2017.

million m³ from crushing.³²⁹ According to the plan, dredged sand would ease pressure on coastal dune exploitation in the regions of north and central Morocco.

“Vision 2020”

“Vision 2020” is a strategy focused on high quality, sustainable regional tourism. Of the eight tourist areas identified in “Vision 2020”, six cover the Mediterranean and Atlantic coasts and offer a variety of options based on seaside, cultural or nature tourism.³³⁰ Reform of tourist legislation and regulations is under way with the aim of establishing a culture of high-quality services within tourist establishments and of improving the professionalism of tourist activities.

The strategy is in keeping with SDG target 12.b. The ICZM project for the Oriental region³³¹ has shown that the contribution from tourism in terms of income and jobs for the local populations requires development of a mixed type of tourism, with seaside resort tourism remaining seasonal while ecotourism and cultural tourism would be available virtually all year round.

However, a 2018 report by the Court of Auditors reveals mixed results in how the tourism strategy of Morocco is being implemented overall, including its “Plan Azur”, and the extent of planning and development of the new tourist sites envisaged, one of the pillars underpinning “Vision 2020”.³³²

Plan for a national integrated coastal zone management strategy

As part of the process of producing an ICZM strategy in land-use planning and development, the Ministry of National Territory Planning, Urban Planning, Housing and City Policy launched a study in 2013. Its aim was to develop a diagnosis for a future strategy, design an atlas and an international benchmark, put forward the methods, mechanisms and instruments required for the integrated management system of coastal, land and maritime zones and facilitate instigation of a system for observing the evolution and dynamic at work.

Education

Promoting a culture of sustainability through information, raising awareness and education is already one of the key pillars of the SNDD. Coastal environmental education does not specifically feature but is often included in the context of a general environmental programme.

As regards education, several programmes have been developed and implemented by the Department of Sustainable Development in collaboration with different partners. The programme of environmental and sustainability education,³³³ which comprises a theoretical component to provide participants with information about and understanding of environmental issues and a practical component, also incorporates the subject of the coast and climate change. The practical component is focused on developing and implementing beach clean-up activities.

Institutional framework

Government institutions

Ministry of Energy Transition and Sustainable Development

The LNESP is responsible for monitoring bathing water and beaches and publishes an annual national report and analytical report on bathing water and another on the state of beaches.³³⁴ Since 2018, the LNESP has incorporated monitoring of the hygiene quality of sand, including marine waste, in the National Programme for Monitoring Bathing Water Quality (PNSQEB). In 2020, the Programme covered 60 beaches spread across nine coastal administrative regions in Morocco, including 23 on the Mediterranean coast and 37 on the Atlantic coast. Each beach has two sampling stations to determine contamination of the sand by chemical pollutants, namely, hydrocarbons and heavy metals, and the pathogenic fungi count, and the typology of marine litter.

³²⁹ H. Mounir and others, “Prospects of technical optimization of the environmental governance of the marine sand dredging in Morocco”, *Bulletin de l’Institut Scientifique, Rabat, Section Sciences de la Terre*, No. 37, 2015, pp. 1-11.

³³⁰ www.oecd-ilibrary.org/sites/409d3fd2-en/index.html?itemId=/content/component/409d3fd2-en.

³³¹ Secretary of State for Sustainable Development, “Integrated Coastal Zone Management Project in the Region of the East”, Socioeconomic Impact Assessment, 2018.

³³² “Vision 2020 : autopsie d’un échec” [Vision 2020: Autopsy of a Failure], *Tel Quel*, 2 September 2018.

³³³ www.environnement.gov.ma/fr/124-strategies-programmes/programmes-et-projets/853-programme-d-education-a-l-environnement-et-au-developpement-durable?showall=1&limitstart=

³³⁴ “Surveillance de la qualité des eaux de baignade des plages du Royaume” [Monitoring the Bathing Water Quality of the Kingdom’s Beaches] and “Surveillance de la qualité du sable des plages du Royaume” [Monitoring the Quality of the Sand on the Kingdom’s Beaches], 2020.

ONEDD and the Directorate of Geology, are responsible for the geophysical mapping of the seabed and for nautical information on marine magnetic and gravity data.

Ministry of Equipment and Water

The Directorate of Ports and the Public Maritime Domain within the Ministry develops and monitors policy implementation in the port and public maritime sector, including managing and protecting the sector, increasing its added value and creating new port and maritime infrastructure.

The Directorate is also responsible for managing coastal erosion in Morocco. Many studies have been conducted but no mapping exists on the national scale to provide a common methodology to identify the sectors that combine significant erosion and locations where activities and assets are concentrated. Integrated management of the coastal strip generally involves:

- Integrated management of solid and liquid discharges from the *wadis* in line with water and land-use planning and development policy;
- The sustainable management of strategic sand stocks available on the coast and inshore and protection against overexploitation and illegal extraction;
- Compliance with the 100 m no-build zone as set out in the law governing the coastal zone.

The role of the port authority is fulfilled by the National Ports Agency, a financially autonomous public body and legal entity. The Agency also assesses water and sediment quality in 28 ports, covering the Mediterranean and Atlantic coasts from Saïdia to Dakhla. It is also involved in EIAs, as it has the authority to take any measures required to implement the legal and regulatory provisions relating to security, health and environmental safety and protection within the port sector in the regions where the centres of port operations are located.

Maritime transport is the responsibility of the Merchant Marine Directorate.

Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests

The Department of Marine Fisheries has 18 marine fisheries delegations that cover the country. In ensuring implementation of the Strategy Halieutis, the Department checks and monitors fishing activities and

has set up a comprehensive system for tracing fish products at all stages – catching, landing, transporting, storage, importing, processing, distributing and selling to the end consumer.

It also oversees the National Fisheries Office, which is responsible for organization and marketing, and the INRH, which researches and monitors the marine environment and exploitation of fisheries and fish farming resources. The INRH is tasked with conducting all research, studies, experimental measures and works at sea and on land to evaluate, preserve and enhance the value of the fisheries and fish farming resources and to formulate recommendations for their management and development. The INRH is represented by regional and specialist centres and a network that monitors the cleanliness of the coast. However, it does not currently have the resources to monitor more than 60 exploited species, of the 300 that have been recorded.³³⁵ The sites of fish farming and natural shellfish beds are subject to regular health checks by the INRH to classify their level of cleanliness in terms of microbiological and chemical quality (Circular No. 15.08.12, August 2012).

The mission of the National Aquaculture Development Agency is to promote the development of marine aquaculture for the entire Moroccan coastline. It is responsible for activities including spatial planning for fish farming purposes, namely, aquaculture planning and development. A legislative framework designed specifically for aquaculture is currently being produced (Dahir No. 1-10-201 promulgating Law No. 52-09 creating the National Aquaculture Development Agency).

Ministry of Tourism, Handicrafts and Social and Solidarity Economy

The Ministry of Tourism, Handicrafts and Social and Solidarity Economy draws up and implements government policy on tourism through the Department of Tourism, which itself has a National Office of Tourism for Morocco involved in promotion, marketing and transportation, and the Moroccan Agency for Tourism Development (SMIT). The Department of Tourism is supported by seven regional and 18 provincial bodies. The Moroccan National Tourism Confederation (CNT) liaises between the public and private sectors.

Other institutions

A further marine observatory, the North African Al Hoceima Marine Observatory, is being built as part of

³³⁵ Court of Auditors, Annual Report 2018; Strategy Halieutis for the years 2010–2016.

the ODYSSEA project.³³⁶ This regional platform will provide oceanographic information and forecasting for inshore and offshore waters.

The National Commission on Integrated Coastal Zone Management was created by Decree No. 2-15-769 in 2015. Rather than creating an additional agency,³³⁷ the Government opted for a governance mechanism in the form of a network that will feature the creation of regional commissions on ICZM. The commissions will each have a regional scheme based on the methodological guide³³⁸ that developed out of preparatory work on the first SRL, that for the Rabat-Salé-Kenitra Region. The commissions will also be involved in the event that there is an EIA that has implications for the coastal region.

According to a press release from the Ministry of Energy, Mines and the Environment in November 2020, a specialist committee has been set up to produce a roadmap from January 2021 for developing marine current energy.³³⁹

The press release states that this initiative is part of a package of similar actions in the fields of natural gas, hydrogen and biomass and adds that Morocco envisages producing over 52 per cent of its electricity from renewable sources by 2030.

Surveillance of land-based and marine pollution in the Mediterranean is conducted in the context of the Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources of the Barcelona Convention (MEDPOL).

The Moroccan national network comprises the LNESP, INRH, INH and ONEE Water Branch. MEDPOL has seen the recent addition of an integrated surveillance and evaluation programme, also adopted within the framework of the Barcelona Convention. The programme is based on 11 environmental objectives covering 27 indicators, of which nine deal with marine eutrophication, contaminants and waste.

The Royal Institute for Strategic Studies (INÉS) has published its deliberations on the strategic issues for maritime spaces in Morocco.³⁴⁰

No centre of excellence³⁴¹ on the sea and fisheries resources yet exists in Morocco that is capable of supporting the adoption of a coordinated approach to the country's national capacities.

Others

The mission of the Mohammed VI Foundation for the Protection of the Environment³⁴² is to raise awareness of sustainable development and to educate on the subject. The Foundation has introduced various tools and training programmes aimed at all sectors of the population, from school pupils to political and economic decision-makers and the public at large.

As regards the coast, the Foundation helps to protect the environment and to attain many SDG targets through its "Sauvegarde du littoral" (Preservation of the Coastline) Programme, which includes four different projects, namely, the Clean Beaches Programme, the Marchica lagoons, Oued Eddahab Bay and the Intercontinental Biosphere Reserve of the Mediterranean (box 12.2).

³³⁶ <https://odysseaplatform.eu/>.

³³⁷ Many agencies have been established in the last 10 years. Those with particular interest in the coast include the National Agency for the Development of Renewable Energy and Energy Efficiency and the National Aquaculture Development Agency.

³³⁸ Ministry of Energy, Mines and the Environment, Department of the Environment, and World Bank Group, Technical Assistance Project, Integrating the Coastal Zone Management Approach into the Territorial Planning and Development Process. Design of the Regional Coastal Scheme for the Region of Rabat-Salé-Kenitra. Methodological Guide for the Development of Regional Coastline Schemes, 2020.

³³⁹ www.infomediaire.net/le-maroc-va-exploiter-lenergie-de-ses-courants-marins/.

³⁴⁰ Royal Institute for Strategic Studies (INÉS), Strategic Challenges for Maritime Spaces. Proceedings of the International Meeting, Rabat, 30 November 2015.

³⁴¹ M. Najim, "Un 'centre d'excellence' est une structure de recherche physique ou virtuelle qui regroupe des ressources matérielles et humaines existantes pour collaborer avec d'autres chercheurs ou institutions d'autres disciplines sur des projets à long terme". ["A 'centre of excellence' is a physical or virtual research establishment that pools existing material and human resources to collaborate with researchers or institutions from other disciplines on long-term projects."] "La structuration de la recherche scientifique : analyse de la situation et recommandations" [Building Scientific Research: Context Analysis and Recommendations], Royal Institute for Strategic Studies (INÉS), 2011.

³⁴² Mohammed VI Foundation for the Protection of the Environment, "Jeunes reporters pour l'environnement" [Young Eco-Reporters]. 2006. www.fm6e.org/fr/-jeunes-reporters-pour-lenvironnement/introduction.html.

Box 12.2: Projects under the “Sauvegarde du littoral” Programme

Various training tools are offered via the Programme's projects to all relevant stakeholders in the regions – school pupils, public authorities and the general population. These projects prioritize the sustainable development of coastal and maritime zones. They are a response to SDG targets 14.1, 14.3, 14.7, 14.a and 14.c, which focus on protecting the maritime environment, and to SDG targets 12.2 and 12.5 and their objective of sustainable consumption. The aim of the projects is as much to reduce pollution as to encourage local authorities to maintain standards of environmental compliance in coastal environments. The Clean Beaches Programme, launched in 1999, comprises several initiatives and beach clean-ups are among the principal tools. The 2019 campaign, accompanied by the hashtag *#b7arblaplastic*, was also aimed at raising awareness of beach pollution online. The activities involved led to hundreds of tons of waste being collected. The Blue Flag scheme, which is an internationally recognized system of certification for beaches, was introduced in 2002. In 2020, 26 beaches of 39 that applied, plus Saïdia marina, were awarded this certification. The Programme also focuses on protecting biodiversity by encouraging a balance to be maintained among ecosystems in both ocean and land environments. Emphasis is placed on endangered species in keeping with SDG target 15.5. For example, two biological reserves and the Marsad Observatory on Marchica Nador lagoon, which monitors ecological diversity and environmental quality, have been created in the Marchica lagoons to maintain the region's ecology.

Education and inclusion are central to the Programme. By implementing these projects, the Foundation is helping reach SDG target 4.7, directly linked to school education, and SDG targets 5.1, 5.5, 10.3 and 12.8. Each project includes an educational and information component in which the emphasis is placed on raising the awareness and building the capacities of the stakeholders concerned, from school to local authority level.

The Programme also helps create fair employment by enabling local communities to take an active part in the projects (SDG targets 8.4 and 8.5) and helps reduce poverty (SDG target 1.4). The emphasis is on promoting sustainable tourism to contribute to economic growth, on the one hand, and to preserve the environment, as set out in SDG target 8.9, on the other. Over and above education, the various initiatives promote the concept of partnership by involving different public and private bodies, both national and international, as specified in SDG targets 16.7, 17.9, 17.16 and 17.19. These partnerships, along with the innovations that contribute to protecting the coastline, have been awarded Lalla Hasnaa Sustainable Coast Trophies.

The Programme supports projects geared towards the three major ocean-population interfaces – coast, beach and coastal wetlands. In particular, the Foundation launched the first “Rendez-vous du Littoral Durable” (A Date With the Sustainable Coast) event in 2016 to encourage community-based initiatives by residents of coastal areas – technical experts, members of local organizations and university personnel – in the form of the Lalla Hasnaa Sustainable Coast Trophies.

Lastly, the Foundation offers the possibility of healthy, thriving environments. The measures taken as part of the projects help prevent infections and diseases (SDG target 3.9). The projects ensure the supply of good quality water (SDG targets 6.2 and 6.3) and ensure that fishing practices are sustainable and productive, thus promoting food security within the country (SDG target 2.3). Infrastructure is renovated and constructed in harmony with ecosystems, affording the population sustainable spaces (SDG targets 11.6 and 11.7). In the Intercontinental Biosphere Reserve of the Mediterranean, for example, the emphasis is on balancing economic, social and environmental interests associated with the Tangier Med port project by preventing, correcting and compensating for the environmental impacts.

The primary mission of the Hassan II International Environmental Training Centre³⁴³ is to educate the public directly and raise the awareness of people of all ages and groups – young people, adults, civil society, administrations, businesses and elected representatives – about the environment. The Centre works to promote good practice, actions and attitudes with the aim of changing behaviours. It trains businesses and administrations to incorporate protecting the environment into their strategic decisions and day-to-day management.

Surfrider Foundation Maroc³⁴⁴ is an organization set up in 2010 in Agadir, regulated by the Dahir of 15 November 1958, for the “protection, development and sustainable management of the coastline in Morocco and its users”. It is part of the Surfrider Foundation

network and is approved by the European Union for its educational, legal and environmental protection programmes, which include:

- “Blue classes”, an awareness-raising initiative that works directly in private and state schools in the Agadir region to strengthen environmental education;
- The role of Eco-ambassador, which was created in 2016 following the UN Climate Change Conference in Marrakesh to follow pupils in different educational establishments over the long term, put them in contact with each other for exchanges on environmental themes and enable them to improve the quality of their environment, particularly within their schools;

³⁴³ The Hassan II International Environmental Training Centre. 2019. <https://centre-hassan2-environnement.ma/home>.

³⁴⁴ www.surfridermaroc.com/.

- A business awareness-raising programme, which provides business-based training in how to protect the environment and preserve natural resources;
- “I love my beach” summer activity, which involves installing information boards and 150 rubbish bins at beaches on the Moroccan coast and has the dual purpose of cleaning up beaches and raising the awareness of holidaymakers by employing 50 beach managers;
- The Ocean Initiatives programme, which primarily aims to raise participants’ awareness of the importance of good waste management by organizing major beach clean-ups;
- A mobile educational unit, the “Surfrider Campus Tour 22”, which is designed to raise awareness of the issues that link ocean and climate and to help rural populations and coastal communities understand the theme of ocean and climate.

Other Moroccan organizations regularly carry out beach clean-ups, sometimes in collaboration with international NGOs.

Projects

As part of implementing the Marine Litter-Med project, and with the support of MEDPOL, the Department of Sustainable Development has run two pilot projects, “Adopt a Beach” and “Fishing Waste”. Four beaches covering the Mediterranean coast at Tangier, Tétouan, Al Hoceima and Nador, were earmarked for the first project. The second project will be implemented at Fnideq Port. Clean-up and fishing waste operations and awareness-raising campaigns directed at decision-makers and the general public have been organized. Campaigns to monitor marine waste on beaches and the seabed have also been carried out in line with the Protocols of the Mediterranean Action Plan (MAP).

The project entitled Favourable Opportunities to Reinforce Self-Advancement for Today’s Youth (FORSATY) was funded by the USAID and implemented by the International Organization for Migration (IOM) in collaboration with the Al Hoceima Association of Teachers of Life and Earth Sciences (AESVT), from October 2012 to September 2019.³⁴⁵ The project was directed towards disadvantaged pupils at risk of dropping out of school. It aimed to offer access to learning support and to engage the pupils in various activities – games,

science experiments, drawing workshops and drama – promoting personal development and increasing self-confidence. The practical activities included beach clean-ups, particularly at Al Hoceima in partnership with the Al Hoceima AESVT and the Green Club at the Faculty of Science and Technology in Al Hoceima.

Funding framework

Funding mechanisms

Donor agencies generally contribute via specific projects over a certain time period. Since the beginning of the 2000s, the principal donor agencies in the coastal domain have been UNDP, the European Union via its various intervention programmes, and the World Bank alongside GEF, in a national or regional context. For example, the Microfinancing Programme (MFP/GEF Morocco) has been supporting local initiatives since its launch in 1998. Of almost 200 community projects in 2020, 51 per cent were about preserving biodiversity, 31 per cent about combating the effects of climate change, 13 per cent about fighting soil degradation, 3 per cent about persistent organic pollutants and 2 per cent about international waters.

National Integrated Coastal Zone Management Plan and regional coastal schemes

For a concrete idea of the extent of funding for the PNL and future SRLs, the primary reference point is the Rabat-Salé-Kenitra SRL project, for which costs from now until 2030 are estimated at 720 million dirhams in total, equivalent to 72 million dirhams or US\$8 million per year for 10 years.³⁴⁶ The funding is broken down as follows:

- 35 per cent for the package of measures and projects relating to managing climate change risks;
- 30 per cent for tackling pollution and rehabilitating ecological, cultural and archaeological sites;
- 24 per cent for nine integrated protection/development projects;
- 5 per cent for R&D;
- 6 per cent for information and awareness-raising.

A particularly large number of actors are involved in such an initiative, namely, donor agencies,

³⁴⁵ <https://2012-2017.usaid.gov/morocco/fact-sheets/favorable-opportunities-reinforce-self-advancement-todays-youth>.

³⁴⁶ Ministry of Energy Transition and Sustainable Development, Department of Sustainable Development and World Bank Group, Technical Assistance Project, Integrating the Coastal Zone Management Approach into the Territorial Planning and Development Process. Design of the Regional Coastal Scheme for the Region of Rabat-Salé-Kenitra. Methodological Guide for the Development of Regional Coastal Schemes, 2020.

government institutions (five ministries in this project), public agencies and offices operating in the area, non-governmental institutions (non-profit and cooperative organizations) and local authorities (regional, provincial and local councils).

A project management unit was set up within the Department of Sustainable Development and is responsible for managing and implementing the project on a day-to-day basis. This includes carrying out all the chosen community investments and subprojects. The representative of the Department at the regional level is assisted by a regional project coordinator and a technical coordination committee, overseen by the ministry. The committee is tasked with coordinating the activities of all the partner bodies involved and ensuring that the work programmes and annual budgets prepared by the participating ministries dovetail properly.

Applying the provisions of international law for the conservation and sustainable use of the seas and oceans and of their resources

At an international level, in 2007, Morocco ratified the United Nations Convention on the Law of the Sea,³⁴⁷ the Convention that gave rise to the International Maritime Organization (IMO) and the International MARPOL Convention. Many other conventions dealt with in other chapters have particular importance for matters concerning the coast and sea, such as the Convention on Biodiversity and the Convention on Climate Change. Since the Rio Summit in 1992, Morocco has signed the majority of multilateral accords that have followed and observes more than 100 environmental agreements relating to environmental protection and sustainable development.³⁴⁸ As regards the Mediterranean Basin, Morocco ratified the Barcelona Convention in 1980. Of the seven protocols and all the strategic documents of the Barcelona Convention, the Protocol on ICZM in the Mediterranean, ratified by Morocco in 2012, has helped provide a framework for a national approach, culminating in the PNL for both the Mediterranean and Atlantic coasts. Analysis of how consistent the text of the law governing the coast in Morocco is with the ICZM Protocol reveals some discrepancies, which could mean the law is lagging behind in terms of the scope of the Protocol “as regards governance and

protection of the coast and the relations between coast, communities and socioeconomic activities”.³⁴⁹

Although not mentioned in the 2020 VNR of progress towards the SDGs, these efforts to transpose international law into national law align perfectly with SDG target 14.c on enhancing conservation of oceans and their resources for more sustainable use by implementing the provisions of international law, as set out in the United Nations Convention on the Law of the Sea.

Integrated coastal zone management and the SDGs

Like the strategic objectives of the PNL, the targets of SDG 14 are interdependent, and that interdependency extends to the targets of all other SDGs in the sense of reinforcing the targets but also, potentially, of having a negative impact on some of them. Developing sustainable coastal fishing, tourism and agriculture helps create jobs and reduce poverty but requires the simultaneous development of social protection programmes for the most deprived. As regards reducing poverty, developing the blue economy can increase pressure on resources and the marine and coastal environment and thus negatively affect the local economy (SDGs 1 and 14). Sustainable fishing and aquaculture and healthy marine ecosystems and habitats are essential for the food security and nutritional needs of coastal communities. However, a growth in farming productivity for food production may undermine efforts to reduce pollution from waste from agricultural inputs, such as pesticides and nutrients (SDGs 2 and 14).

Coastal tourism occupies a fundamental place in developing sustainable tourism, generating jobs and promoting culture and local products (SDGs 8 and 14). The ongoing smooth functioning of the watershed/coastal zone continuum depends on land planning and development and the creation of infrastructure, including urban development of the coastal zone (SDGs 11 and 14). Sustainable modes of consumption and production in agriculture, fishing, industry and private housing can contribute to preventing and/or reducing coastal and marine pollution, minimizing the effects of ocean acidification and protecting marine and coastal

³⁴⁷ This Convention sanctioned some apportioning of the maritime space and granted coastal states prerogatives in some areas. The provisions of article 76 of the Convention give Morocco the right to claim its continental shelf extends beyond 200 miles, that is, beyond the EEZ.

³⁴⁸ Third National Report on the State of the Environment in Morocco, 2015.

³⁴⁹ Z. Benmassaoud and B. Ibnkhalidoun, “La gestion intégrée des zones côtières, outil juridique de préservation du littoral marocain” [Integrated Coastal Zone Management, A Legal Tool for Preserving the Moroccan Coast], *Journal d'Économie, de Management, d'Environnement et de Droit*, vol. 3 No. 1, 2020.

ecosystems (SDGs 12 and 14). The coastal zone and sea are closely linked to policies to mitigate and adapt to changes in the climate and their impact. In this respect, the two SDGs are interconnected in terms of building capacities, increasing knowledge production and exchange and encouraging technological innovation (SDGs 13 and 14).

The targets corresponding to these SDGs can be deployed to inform all action taken that helps maintain the functioning of the coastal and marine ecosystems.* This action covers a large number of measures contained in the PNL, dealing in particular with ecosystem resilience in the face of flooding and submersion risks, controlling coastal flooding and reducing erosion, promoting inclusive socioeconomic growth, taking account of the value of ecosystems and their biodiversity, regulating and reducing all types of emissions and waste and developing human capacities and well-being.³⁵⁰

However, based on information contained in the 2020 VNR, it is difficult to obtain a cohesive vision of efforts – strategies, programmes and projects – that have been forthcoming and have benefited from the development of integrated coastal and maritime zone management. An absence of data for some SDG targets means they cannot be quantified (14.1, 14.3, 14.4, 14.6, 14.a, 14.b, 14.c and 17.17). Others have shown slight progress (8.9, 9.5 and 14.5), have failed to progress (14.2), have regressed (11.5 and 14.7), have shown positive progress (6.3, 7.2, 9.1, 9.4, 11.6, 12.5, 16.7) or have shown a slow-down in progress (8.2).

Given existing data, and as recommended in the report by the Moroccan Court of Auditors devoted to the SDGs, it should be possible to extend coverage of the SDG indicators and targets and to cross-reference them in a relevant way so as to better understand the policies that cut across different sectors, such as that concerning the coastal zone and the sea.³⁵¹

12.6 Assessment, conclusions and recommendations

Assessment

Marine and coastal zone management occupies an important place. The littoral represents a key area in which numerous economic activities and

infrastructure are developed, including fishing, port operations, tourism and sand exploitation, and is home to a large percentage of the population. The coastal zones thus experience a significant proportion of the anthropogenic pressures on the Moroccan environment.

Morocco has recently made efforts in terms of managing these areas, safeguarding ecosystems, managing resources and promoting economic activities while taking into account the requirements of sustainability. Law No. 81-12 on the Coastal Zone adopted planning instruments as a necessary means of ensuring integrated management of the coastline, including the PNL and the regional coastal plans. The PNL aims to:

- Determine the general guidelines and objectives to be achieved on protection, development and conservation of the coastline, taking into account the national land-use planning policy, the economic and social development objectives and the provisions of Law No. 81-12;
- Integrate the coastal protection dimension into sectoral policies, particularly on industry, tourism, housing and infrastructure works;
- Establish indicators to be considered to ensure coherence between investment programmes and define the means to harmonize the development projects to be carried out on the coast;
- Provide for measures to be taken to prevent, combat and reduce coastal pollution and ensure consistency and complementarity among regional coastal plans.

The Strategy Halieutis has implemented several projects for the sustainable development of the sector, notably in terms of fisheries management, the fight against illegal, unreported and unregulated fishing, and the upgrading and modernization of the coastal and artisanal fishing fleet. Likewise, the 2030 National Ports Strategy seeks to increase the capacity of the sector while incorporating a “responsible and sustainable” dimension. As regards protected areas, the NBSAP, which had already taken action in marine habitats, should be more widely applied to coastal zones as a result of the PNL and SRLs. Lastly, other institutions have set up programmes that help inform the public and raise awareness of the need to protect coastal ecosystems. So far, beach protection

³⁵⁰ Schipper, C.A., Dekker, G.G.J., de Visser, B., Bolman, B., Lodder, Q. 2021. Characterization of SDGs towards coastal management sustainability performance and cross-linking consequences. Sustainability, vol. 13, No. 3, 2021. <https://doi.org/10.3390/su13031560>.

³⁵¹ Cour des comptes, Rapport thématique sur l'état de préparation du Maroc pour la mise en œuvre des ODD 2015–2030, 2019.

programmes have constituted significant progress in this process.

However, the pressures exerted by the coastal activities in place are exacerbating, and will continue to exacerbate, the degradation of these zones, which, by their nature, are fragile and vulnerable to climate change. Scenarios envisaged between now and 2030 clearly show that continuing on current trends is not a viable option.

Although the development plans put in place in Morocco have led to real successes in terms of sustainability, resource management is not sufficiently strengthened. Some fish stocks continue to be overexploited. Fish stocks are monitored by the INRH, and reports are published annually on its website.

Underinvestment in preserving the ecosystem continues. Although legislation aims to limit the impact of fishing and commercial vessels, there are still legal loopholes, and the desire to promote these sectors of the economy continues to exert pressure on the environment. The percentage of protected areas along the coastal zone remains low.

Erosion is also a major problem that risks worsening in the wake of climate change and human activity. In this respect, development policies fail to take proper account of the issue, and scientific participation and adequate monitoring are also lacking.

The effective implementation of SRLs depends on all local actors and decision-makers taking ownership of the process. Preparing an SRL involves a particularly large number of actors – donor agencies, multiple government institutions, public agencies and offices operating in the area, non-governmental institutions and local authorities at the regional, provincial and local levels. These schemes are a recent innovation or are in the process of development, which means that long-term analysis of their effectiveness is still not possible. The first SRL project, in the Rabat-Salé-Kenitra Region, offers a template of more detailed performance indicators of how the SRL is being implemented, although, in terms of governance, the template does not include SO5, which is an essential factor in successfully implementing the SRL.

In terms of monitoring and evaluation, as indicated in the PNL draft decree, the principal indicators for monitoring the strategic areas and objectives do not automatically encompass each of the objectives, given that, for some objectives, such as SO5 (strengthening the participatory process), qualitative data based on surveys, for example, may be entered in the indicators. Data is generally sparse, non-existent or impossible to

obtain, which means pollution in the different sectors or degradation of the ecosystems cannot be adequately monitored.

The efforts made do not enable Morocco to be up to date with achieving the SDGs, particularly those aimed at the preservation and sustainable exploitation of the oceans, seas and marine resources (SDG 14). The different strategies do fall within the rationale of sustainable development with economic, environmental and social aspects being integrated. This is notably the case with the objectives of the PNL, which are explicitly formulated to accord with the SDGs and are based on the interconnectedness of the different sectors. However, on the basis of the information contained in the 2020 VNR of progress towards achieving the SDGs, it is difficult to evaluate the efforts agreed on to develop ICZM. No discernible progress has been made on achieving SDG target 14.2 concerning EEZ management by deploying ecosystemic approaches. The latest data available, from 2016, for the extent of marine protected areas (SDG 14.5) shows that the country is falling well short of the target set – just 0.0007 per cent as opposed to 10 per cent.

Conclusions and recommendations

Preventing and reducing marine pollution

Considerable efforts have been made to reduce and process inputs of liquid and solid pollutants. The nature of these pollutants varies widely. In addition to excess nutrients resulting from diffuse farm run-off, many toxics, sometimes highly persistent, pollutants issue from industrial activities, concentrated particularly in major urban, port centres such as Casablanca. The Fourth National SOER in Morocco estimated that more than 50 per cent of this industrial wastewater was discharged into the sea in 2020. Other than the indicator of potential coastal eutrophication, no other indicator charts the evolution of these pollutants in the coastal zone and sea.

Recommendation 12.1:

The Government should:

- (a) *Continue efforts to reduce and process inputs of liquid and solid pollutants to implement the corresponding SDG targets in line with appropriate indicators of eutrophication of coastal wetlands and the density of plastic debris on beaches;*
- (b) *Establish indicators for monitoring persistent organic pollutants.*

Coastal erosion/accretion

There is no systematized approach to knowledge of and responses to the phenomena of submersion and erosion in the most sensitive areas. No national mapping exists of the hazards associated with erosion and submersion, which could identify, on the basis of a common methodology, areas combining serious erosion and the need to preserve the natural, cultural and built heritage, and on which the National Strategy of Natural Disaster Risk Management 2020–2030 relating to natural disasters could rely.

Recommendation 12.2:

The Government should:

- (a) *Ensure a systematized approach to knowledge of and responses to the phenomena of submersion and erosion in the most sensitive areas;*
- (b) *Accelerate the completion of national mapping of the hazards associated with erosion and submersion on which the National Strategy of Natural Disaster Risk Management, could rely, and make it available to stakeholders;*
- (c) *Operationalize the National Strategy of Natural Disaster Risk Management by proposing mitigation measures.*

Sustainably managing and protecting marine and coastal ecosystems

The PNL, like other strategic documents, prioritizes issues of governance. The intersectoral and interpolicy complexity of future regional ICZM schemes, in addition to the existence of regional coastal commissions, means that for them to be implemented they must be underpinned by a legal framework (on use of the PMD), institutional arrangements (intercommunity structures and public/private partnerships) and sustainable, participatory processes that take account of social networks and how they traditionally operate from the regional to local community level.

Recommendation 12.3:

The Government should:

- (a) *Accelerate the development of regional coastal schemes in line with the Law on the Coastal Zone and its implementing regulations, and promote intercommunity structures and public–private partnerships for*

the implementation of regional coastal schemes;

- (b) *Prepare a national mapping of traditional practices involved in managing the coast and sea for the development of policies to protect and preserve the coastal zone.*

Preserving the coastal and marine zones

As the evolution of SDG indicator 14.5.1 reveals, the extension of MPAs, including fishery areas, remains extremely limited in response to Aichi Target 11. As stated in the NBSAP for the period 2016–2020, accelerating the extension of MPAs, including fishery areas, would appear to be a matter of urgency.

Recommendation 12.4:

The Government should consider accelerating the extension of marine protected areas, starting with those sites of biological and ecological interest already identified on the coast, and streamline their management plans in close association with local stakeholders.

Recommendation 12.5:

The Regional Commissions on Integrated Coastal Zone Management, under the aegis of the National Commission on Integrated Coastal Zone Management, should ensure the integration of the management of marine protected areas in their respective regional coastal schemes.

Conservation and sustainable use of oceans and their resources

In the context of enacting Laws No. 37-17 and No. 38-17 and of related deliberations, such as those of the Royal Institute for Strategic Studies on the strategic issues in the maritime domain, and of the Economic, Social and Environmental Council on the blue economy, marine and maritime units that support the growth of the blue economy have not yet been established. Such units would complement the integrated management of coastal zones and would enable the public authorities and stakeholders to adopt an ecosystem approach that is coordinated, integrated and cross border, which applies to the whole of the Moroccan EEZ.

Recommendation 12.6:

The Government should promote marine spatial planning, in a manner similar to integrated coastal zone management, to ensure the sustainable use of ecosystem services and improve the economic profitability of the use of the ocean and its resources.

PART III
INTEGRATION OF THE ENVIRONMENT INTO
HEALTH AND OTHER SECTOR POLICIES

HEALTH AND THE ENVIRONMENT

13.1 Population state of health

Population growth

According to the 2010 census, the population of Morocco was 31,851,123. This figure remained stable, with 33,769,512 inhabitants recorded in the 2014 census. According to demographic projections by the High Commission for Planning (HCP), the Moroccan population would rise over subsequent years to 35.952 million in 2020. Average annual population growth between 2010 and 2020 was estimated to be 1.1 per cent (figure 13.1).

Under-15-year-olds represented 29.4 per cent of the population in 2010 and 28.2 per cent of the population in 2014. Showing the opposite trend, the over-60s represented 8.2 per cent of the population in 2010 and 9.4 per cent in 2014. According to the HCP projections, in 2018, the proportion of under-15-year-olds in the population would have declined to 26.6 per cent while the over-60s would have risen to 10.5 per cent, an increase of almost 2 per cent in less than 10 years. The trend in Morocco is thus towards an ageing population, with the proportion of over-60s projected to reach 13.5 per cent in 2025 and 15.4 per cent in 2030.

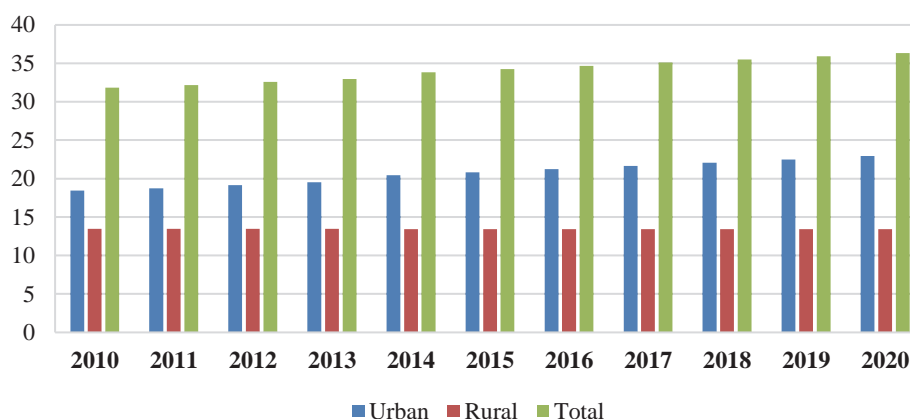
The urban population represented 57.99 per cent of the total Moroccan population in 2010 and 60.3 per cent in 2014.

According to the demographic projections of the HCP, 63.37 per cent of the population would be living in urban areas and 36.62 per cent in rural areas in 2020. Over the last decade, the proportion of the population living in urban areas has increased while the population living in rural areas has tended to decline, falling to 13,417,000 inhabitants in 2020. The shift in the population towards urban areas is seen as the result of a rural exodus and the urbanization of rural areas.

According to statistical reports on health for Morocco in 2011 and 2017, life expectancy rose from 74.8 to 75.9 years between 2010 and 2016. In 2016, life expectancy at birth was 77.6 years for women and 74.3 years for men; between 2010 and 2016, the increase in life expectancy at birth for women (75.6 years in 2010) rose more sharply than that for men (73.9 years in 2010). In 2016, a significant difference of almost five years was observed between the population living in urban areas, where life expectancy was 77.8 years, and the population living in rural areas, where life expectancy was 72.9 years. This applied to both sexes, with women enjoying 4.3 years and men 5.4 years of greater life expectancy at birth if they lived in an urban rather than a rural area.

Data provided by the WHO Global Health Observatory for 2019 indicated life expectancy at birth in Morocco as 74.3 years for women and 71.7 years for men.³⁵²

Figure 13.1: Projected growth in target populations for health programmes, 2014–2020, million



Source: Ministry of Health, Health in Figures, 2014 and 2017.

³⁵² www.who.int/countries/mar/.

Photo 13.1: Upgraded water and sanitation infrastructure, primary school Essafa, Mohammedia prefecture, Casablanca-Settat Region



Photo credit: ECE EPR Team

The overall illiteracy rate was 32.2 per cent in 2014. The illiteracy rate was 4.8 per cent among 10–18-year-olds. Girls and young women were more exposed to illiteracy than boys and young men – 5.9 per cent and 3.8 per cent respectively – and illiteracy rates were higher in rural areas (8.5 per cent) than in urban areas (1.9 per cent).

Infant and maternal mortality

The crude death rate was 5.6 per thousand in 2010, which fell to 5.2 per thousand in 2016 and 5.1 per thousand in 2018. It was lower in urban areas (4.4 per thousand in 2010 and 4.3 per thousand in 2016) than in rural areas (7.2 per thousand in 2010 and 6.7 per thousand in 2016).

According to the 2018 National Survey on Population and Family Health (ENPSF), infant mortality in Morocco stood at 18 deaths per thousand births, with a higher rate of 21.6 deaths per thousand births in rural areas compared with 14.9 deaths per thousand births in urban areas. Compared with the 2011 ENPSF, the infant mortality rate for babies under one year old declined by 38 per cent, falling from 28.8 per thousand live births in 2011 to 18 per thousand live births in 2018. Of 1,000 one-year-old infants, 4.2 will not reach their fifth birthday.

The health disparities observed between urban and rural areas may be explained by difficulties in accessing maternal and infant primary health-care services – antenatal and postnatal care and monitored childbirth – which are more marked in rural than in urban areas. The same applies to medicines and

equipment for the health of mothers and babies, which are not always accessible for families living in rural areas. Furthermore, the shortage and unequal distribution of health professionals working in some essential specialisms for maternal and infant health – e.g., gynaecology, paediatrics, neonatology, paediatric emergency care and midwifery – exacerbate the difficulties in accessing care.

The results of the 2018 ENPSF demonstrate that the likelihood of a child dying before reaching the age of five is 22.2 per thousand and is higher in rural areas (26 per thousand) than in urban areas (18.8 per thousand). Infant mortality (under one year) represents 81 per cent of child mortality (under five years), and neonatal mortality (under one month) represents 75 per cent of infant mortality. Compared with the results of the 2011 ENPSF, the 2018 findings show a 27 per cent drop in the child mortality rate, from 30.5 per thousand in 2011, and a 38 per cent drop in the infant mortality rate, from 28.8 per thousand in 2011 (figure 13.2).³⁵³

Figure 13.2: Comparative trends in levels of child mortality among under-5-year-olds per 1,000 live births

	ENPSF 2003–2004	ENPSF 2011	ENPSF 2018
Neonatal	27.0	27.7	13.6
Infant	40.0	28.8	18.0
Child	47.0	30.5	22.2

Source: ENPSF 2003–2004, 2011 and 2018.

As regards SDG target 3.2, given a mortality rate of 22.2 per thousand for children under 5 years old in

³⁵³ www.unicef.org/morocco/media/2046/file/Situation%20des%20enfants%20au%20Maroc%202019.pdf.

2018, achieving the Moroccan national target of 12 deaths per thousand in 2030 would mean almost halving this rate. The same applies to the neonatal mortality rate, which needs the 2018 rate of 13.6 per thousand to be cut by almost 50 per cent to achieve the target of 7 per thousand in 2030.

According to the 2018 ENPSF, which is based on results collected in 2016–2017, the maternal mortality rate fell to 72.6 per 100,000 live births, having been 112 per 100,000 live births in 2010. This decrease is attributed to the development of health services for women. The provision of free childbirth services in public hospitals should also be noted. Maternal mortality is more than twice as high in rural areas as in urban areas. The maternal mortality rate in rural areas was 148 per 100,000 births in 2010 and had fallen to 111.1 per 100,000 births at the time of the 2018 ENPSF. In urban areas, the rate was 73 per 100,000 births in 2010 and 44.6 per 100,000 births according to the 2018 ENPSF. With 72.6 maternal deaths per 100,000 live births reported in 2018, Morocco is nearing SDG target 3.1. The proportion of births attended by skilled health personnel (SDG indicator 3.1.2) was 73.6 per cent in 2010 and had reached 86.6 percent in 2018. In urban areas, 96 per cent of births were attended by skilled health personnel, as were 73.7 per cent in rural areas.

The different data presented reflect significant health inequalities experienced by the general population and by mothers and children depending on whether they live in an urban or rural area.

Mortality by principal cause of death

In 2010, 52,445 deaths were recorded and, in 2015, 50,798 deaths were recorded (table 13.1). The principal causes of death in 2015 were similar to those in 2010. Diseases of the circulatory system were the primary cause of death, responsible for 28.4 per cent of deaths among women and 25.5 per cent of deaths among men. Heart disease was responsible for around 17.5 per cent of deaths for both sexes. An upward trend was evident in the proportion of deaths attributable to circulatory diseases, which accounted for 26.7 per cent of all deaths in 2015 compared with 22 per cent of all deaths in 2010. Malignant tumours were the second leading cause of death in both 2010 (11.5 per cent of all deaths) and 2015 (12.9 per cent of all deaths). The third leading cause of death was from perinatal-related disorders, which showed a downward trend from 9.8 per cent in 2010 to 8.7 per cent in 2015. Among these deaths in 2015, prematurity accounted for 3.3 per cent

and perinatal infections 1 per cent. The fourth leading cause of death was the result of endocrine, nutritional and metabolic diseases, which accounted for 6 per cent of deaths in 2010 and 6.8 per cent in 2015. Diabetes mellitus was responsible for 6.1 per cent of deaths in 2015, up from 5.3 per cent of deaths in 2010. The percentage of women dying from diabetes in 2015 (7.4 per cent) was greater than that for men (5.1 percent). External causes of morbidity and mortality in 2015 represented 6.2 per cent of deaths and were markedly higher among men (8.7 per cent) than women (3 per cent). Respiratory diseases were ranked sixth as the cause of death, responsible for 5.7 per cent of deaths in 2015, with asthma responsible for just under 1 per cent of deaths. Infectious and parasitic diseases caused 4.1 per cent of deaths in 2010, and slightly more in 2015 (4.4 per cent).

Trends in morbidity

Non-communicable diseases

Demographic and epidemiological transition in Morocco is increasing the morbidity and mortality load of non-communicable diseases (NCDs). The principal NCDs in the Moroccan population are cardiovascular diseases, cancer, diabetes, chronic respiratory diseases, chronic renal failure and mental health disorders. There is evidence of a reduction in communicable diseases.³⁵⁴

NCDs are the principal cause of mortality, accounting for 80 per cent of all deaths: cardiovascular diseases (38 per cent of all deaths), cancers (14 per cent), diabetes (6 per cent), chronic respiratory diseases (4 per cent) and other NCDs (18 per cent). This places Morocco among those countries with a high mortality due to NCDs in the region covered by the WHO Regional Office for the Eastern Mediterranean.

Communicable, perinatal, maternal and nutritional diseases represent 14 per cent of deaths, and deaths from trauma 6 per cent.³⁵⁵ WHO points to a high degree of uncertainty surrounding these estimates of mortality, as they are not based on any national data for NCD-related mortality. The mortality rate attributable to cardiovascular diseases, cancer, diabetes and chronic respiratory diseases was 12.4 per cent in 2018; the target set by the country is 4.2 per cent by 2030 (indicator 3.4.1). The mortality rate for suicide per 100,000 people fell from 4.8 in 2015 to 2.9 in 2016. The country has set a target of 2.6 by 2030. Of the 1,014 cases of suicide recorded in 2016, 613 were women (60.4 per cent).

³⁵⁴ www.sante.gov.ma/Documents/2019/05/Rapport%20de%20l%20enqu%C3%AAt%20Stepwise.pdf.

³⁵⁵ www.who.int/nmh/countries/mar_en.pdf?ua=1.

Table 13.1: Cause of death by sex, 2010 and 2015, percentage

	2010			2015		
	Male	Female	Total	Male	Female	Total
Infectious and parasitic diseases	4.6	3.4	4.1	4.8	4.0	4.4
Infectious and intestinal diseases	0.3	0.3	0.3	0.3	0.3	0.3
Tuberculosis	1.6	0.6	1.2	1.5	0.7	1.2
Septicaemia	1.8	1.7	1.8	2.1	1.9	2.0
Malignant tumours	11.3	11.8	11.5	13.2	12.5	12.9
Malignant tumours of the digestive system	2.4	2.7	2.5	2.7	2.8	2.7
Malignant tumours of the respiratory system	2.6	0.7	1.8	3.2	0.9	2.2
Diseases of the blood and blood-forming organs and disorders of the immune system	0.7	0.8	0.7	0.7	0.9	0.8
Endocrine, nutritional and metabolic diseases	5.1	7.2	6.0	5.7	8.2	6.8
Diabetes mellitus	4.5	6.5	5.3	5.1	7.4	6.1
Dehydration	0.4	0.4	0.4	0.2	0.3	0.2
Mental health and behavioural problems	0.3	0.3	0.3	0.4	0.3	0.4
Diseases of the nervous system	2.5	2.9	2.7	2.2	2.2	2.2
Meningitis	0.3	0.3	0.3	0.2	0.2	0.2
Epilepsy	0.3	0.3	0.3	0.3	0.3	0.3
Diseases of the circulatory system	21.4	22.9	22.0	25.5	28.4	26.7
Hypertension disease	2.1	3.3	2.6	1.7	2.8	2.2
Heart disease	13.5	12.9	13.3	17.5	17.5	17.5
Diseases of the respiratory system	5.6	4.7	5.2	6.5	4.5	5.7
Pneumonia	1.8	1.2	1.6	2.3	1.7	2.0
Asthma	1.0	1.1	1.1	1.0	0.7	0.9
Diseases of the digestive system	3.1	3.2	3.1	2.7	2.9	2.8
Cirrhosis of the liver	0.7	0.8	0.7	0.4	0.6	0.5
Skin and soft tissue diseases	0.1	0.1	0.1	0.1	0.2	0.2
Diseases of the osteoarticular system, the muscles and connective tissue	0.2	0.3	0.2	0.1	0.2	0.2
Genitourinary system diseases	3.1	2.9	3.0	2.9	2.7	2.8
Renal failure	2.4	2.6	2.5	2.1	2.3	2.2
Pregnancy, childbirth and postpartum	0.0	0.3	0.1	0	0.4	0.2
Perinatal-related disorders	10.3	9.1	9.8	9.2	8.0	8.7
Prematurity	3.7	3.6	3.7	3.4	3.1	3.3
Perinatal infections	1.1	1.0	1.1	1.0	0.9	1.0
Congenital disorders and chromosomal abnormalities	1.2	1.3	1.2	1.5	1.7	1.6
Traumatic injuries, poisoning and other consequences of external causes	3.5	1.3	2.6	n.d.	n.d.	n.d.
External causes of morbidity and mortality	7.2	2.5	5.3	8.7	3.0	6.2
Symptoms, signs and abnormal results from clinical tests not classified elsewhere	19.8	24.9	21.9	15.8	19.9	17.6
Total (number)	30 707	21 738	52 445	28 794	22 004	50 798

Source: Ministry of Health, Health in Figures, 2011 and 2017.

Cancer

Three cancer registers exist in Morocco: (i) the register for Greater Casablanca, created in 2003; (ii) the Rabat cancer register, created in 2005; and (iii) the hospital cancer register, created in 2005 and held at the Hassan II University Hospital in Fès, which documents the population of east Morocco. Data are collected for public health research purposes in line with the standards of the International Agency for Research on

Cancer (IARC). As a monitoring mechanism, the registers contribute to the creation of a national cancer database. The sources of the data comprise public hospitals, oncology centres, private clinics and public and private anatomic pathology laboratories. Since 2015, Municipal Hygiene Offices (BCHs) have been included as a source of case reporting. They work with the registers by notifying deaths from cancer. The most recent data available are for the years 2008–2012.³⁵⁶

³⁵⁶ www.irc.ma/en.

The IARC estimates that the cancer mortality rate in Morocco is 86.9 per 100,000.

Almost 50,000 new cases of cancer are recorded in Morocco each year. The most common types of cancer (data for men and women combined) are breast cancer, which is the most prevalent and accounted for 20 per cent of cases recorded between 2008 and 2012, lung cancer (11.4 per cent) and colorectal cancer (6.7 per cent).

The increase in the incidence rate for cancer, from 101.7 per 100,000 population in 2004 to 137.3 per 100,000 in 2012, is due to numerous factors relating to an ageing population, risky behaviours (e.g., smoking, poorly balanced diet), a sedentary lifestyle and obesity, environmental considerations (e.g., different forms of pollution and work-related exposure) and better access to cancer diagnosis and early detection programmes. According to data from the Stepwise survey conducted by the then Ministry of Health in 2017, 11.7 per cent of Moroccans aged 18 years and over smoke tobacco, 21.1 per cent do not take sufficient exercise, 53 per cent are overweight and 20 per cent are obese, 39.9 per cent of people aged between 18 and 69 years have at least two risk factors and 1.7 per cent consume alcohol.

Among women, breast, cervical and ovarian cancer represent almost 53 per cent of cases. The study entitled “Cervical cancer: Current situation and management in Morocco” provides public health data and elements relating to cervical cancer in Morocco.³⁵⁷ Cervical cancer is ranked second to breast cancer in terms of incidence and mortality among Moroccan women. The most recent estimates by IARC indicate that around 3,388 cases of cervical cancer were diagnosed in 2018, compared with 2,258 in 2012, and the number of deaths from cervical cancer more than doubled, with approximately 2,465 women dying in 2018 as against 1,076 in 2012. Among young Moroccan women aged between 15 and 44 years, the crude incidence rate is 7.5 per 100,000 women. Morocco has a population of 13.6 million women ages 15 years and older who are at risk of developing cervical cancer.³⁵⁸ Human papillomavirus (HPV) vaccines were introduced in Morocco in 2008. They are recommended for girls and young women aged between 11 and 25 years, ideally before they become sexually active. There is, however, no government-funded vaccination programme.

Pleural cancer caused by exposure to asbestos is recorded in pleural mesothelioma figures.³⁵⁹ For the period 2008–2012, mesothelioma represented 0.12 per cent of cancers recorded by the register for the Greater Casablanca area, equivalent to 29 cases in adults over 40 years of age.³⁶⁰

Respiratory diseases

Respiratory diseases are the sixth major cause of death among the Moroccan population. Asthma is the cause of 1 per cent of deaths for both sexes.

The study entitled “Particularity of asthmatic patients in the Sahara: Example of the Guelmim Oued Noun region, Morocco” shows that the principle factors triggering attacks are environmental, such as dust particles (81 per cent), infections (76 per cent), cold and foggy conditions (72 per cent), smoke (66 per cent), caustic products (62 per cent) and medicines (10 per cent), with physical effort being a factor in 66 per cent of cases.³⁶¹ From a medical perspective, 19 patients (10 per cent) received no treatment. Asthma is well controlled in 59 per cent of patients, partially controlled in 32 per cent and uncontrolled in 9 per cent. This study highlighted an asthmatic, mainly female and frequently overweight population, issues with climatic conditions, lack of spirometry diagnosis, poor adherence to treatment and frequent self-medication. The study concludes that these parameters could be changed if there were a willingness on the part of local authorities, health workers and the patients themselves.

Addiction

Alcohol consumption was equivalent to 0.69 l of pure alcohol per inhabitant over 15 years of age in 2016 and 0.74 l of pure alcohol per inhabitant over 15 years of age in 2017. Indicator 3.5.2 shows a static or even upward trend, with the risk that the target of 0.4 l of pure alcohol per inhabitant aged over 15 years in 2030 will not be met.

The prevalence of drug use among the Moroccan population aged 15 years and over was 4.1 per cent, including 2.8 per cent who were dependent on such substances. Drug consumption and dependency today affects increasingly young populations. The practice of injecting drugs is linked to the spread of the epidemic in HIV, hepatitis C and B viruses and

³⁵⁷ www.sciencedirect.com/science/article/abs/pii/S0007455119303376?via%3Dihub.

³⁵⁸ https://hpvcentre.net/statistics/reports/MAR_FS.pdf.

³⁵⁹ In general, 80–85 per cent of mesothelioma cases are due to exposure to asbestos.

³⁶⁰ www.irc.ma/en.

³⁶¹ www.sciencedirect.com/science/article/abs/pii/S1877032020304437.

tuberculosis. It also entails social consequences, such as marginalization, discrimination and isolation, and legal consequences, such as delinquency, violence and crime.

Treatment programmes for health problems associated with drug addiction (SDG indicator 3.5.1) involved 15,168 patients monitored in 2016 and 25,685 patients monitored in 2018. Morocco has 15 centres – 12 walk-in centres and three university residential centres – devoted to treating addiction problems, in the cities of Rabat, Casablanca, Tangier, Tétouan, Marrakesh, Oujda, Agadir, Fès and Meknès. Other facilities in the form of walk-in centres are planned.

Malnutrition

In its 2019 report on the situation of children in Morocco,³⁶² UNESCO noted ongoing concern with the evolution in child nutrition indicators. Delayed growth (as a result of chronic malnutrition) is not improving in rural areas and even worsening in urban areas. Moderate or severe low weight, although declining in urban areas, has increased in rural areas, and emaciation or acute malnutrition has also worsened in rural areas. The report indicates that the determinants of malnutrition in Morocco include poor dietary habits, inadequate care, poor hygiene and the inaccessibility of health-care services.

Communicable diseases

The principal communicable diseases affecting the Moroccan population are tuberculosis, severe acute respiratory syndromes, viral hepatitis, HIV, vector-borne diseases (malaria, bilharzia and leishmaniosis) and foodborne diseases. In 2019, the incidence of tuberculosis was 97 per 100,000 population and the incidence of measles was 0.3 per 100,000 population. In 2020, 740 new cases of HIV infection were recorded.

Tuberculosis

Tuberculosis has the highest rate of notifications of all notifiable communicable diseases. In 2017, 30,539 cases were declared, a notification rate of 86.8 per 100,000 population. All regions of Morocco are affected, with the highest incidences in 2017 being observed in the regions of Tangier-Tétouan-Al Hoceima, which had an incidence rate of 126 per

100,000 population (4,683 cases and relapses), Rabat-Salé-Kenitra, which had an incidence rate of 115 per 100,000 population (5,448 cases and relapses) and Greater Casablanca-Settat, which had an incidence rate of 111 per 100,000 population (7,950 cases and relapses). Indicator 3.3.2 has fluctuated between 80 and 100 per 100,000 population for more than a decade. The notification rate was 84.2 per 100,000 population in 2012, was similar in 2015 (84.6 per 100,000) and rose to 86.8 per 100,000 in 2017, while the target for the country is 30 per 100,000 population by 2040.

Linked to poverty, insecurity, malnutrition, unsanitary housing and promiscuity, tuberculosis is especially concentrated in the peri-urban areas of large conurbations.

There are numerous risk factors for tuberculosis in Morocco, predominantly influenced by low socioeconomic status, smoking and an immunocompromized host. A study of the risk factors and diagnosis of tuberculosis in Morocco involving 55 patients indicated that 19 people (34.5 per cent) had a history of tuberculosis; smoking was noted in 29 people (52.7 per cent), cannabis use was noted in 20 per cent of cases, 23 per cent were diabetic, 9.1 per cent were receiving long-term oral corticosteroid therapy or immunosuppressants for a systemic disease, 9.1 per cent were HIV positive, while 9.1 per cent reported previously feeling physically exhausted or undernourished or indicated prior stressful family circumstances.³⁶³ From a socioeconomic perspective, 90 per cent were in a low- or middle-income bracket.

HIV

According to the report relating to the National Strategy on Human Rights and HIV/AIDS for 2018–2021, the number of new HIV infections decreased by 24 per cent and coverage of antiretroviral (ARV) treatment increased from 16 percent to 58 percent between 2010 and 2017. In 2019, indicator 3.3.1 was 0.03 per 1,000 seronegative people. A lack of data makes it impossible to estimate whether the country will achieve a value of zero in 2030. The prevalence of HIV in Morocco remains low and stable among the general population at around 0.1 per cent. The prevalence is highest among people who inject drugs 7.1 per cent, men who have sex with men 4.5 per cent, migrants 3 per cent, female sex workers 1.3 per cent,

³⁶² www.unicef.org/morocco/media/2046/file/Situation%20des%20enfants%20au%20Maroc%202019.pdf. The authors of the report also specify states that adolescent health is affected by problems associated with tobacco and drug addiction and by issues associated with sexuality, reproductive health and mental health.

³⁶³ www.sciencedirect.com/science/article/abs/pii/S1877120320307047#:~:text=Les%20facteurs%20de%20risque%20de,diagnostique%20pour%20les%20formes%20pleurales.

inmates from 0.5 to 1 per cent and seasonal workers from 0.4 to 1 per cent. The HIV epidemic is therefore concentrated and heterogenous in nature.

At the end of 2017, the number of people living with HIV (PLHIV) in Morocco was estimated to be 20,000, including 8,000 women (40 per cent). The number of children under 15 years of age living with HIV was less than 1,000. The majority (90 per cent) of PLHIV live in urban areas. New HIV infections fell from 1,500 in 2004 to 900 in 2017, a decrease of 34 per cent. Deaths declined by 30 percent from 690 in 2011 to 480 in 2017. Almost 67 per cent of new infections were reported as occurring among key populations and their partners. The majority of seropositive women (70.7 per cent) were reported to have been infected by their partner.

The number of HIV/AIDS cases reported between 1986 and 2017 totalled 14,000. HIV infection is most commonly (90 per cent of cases) sexually transmitted. Vertical transmission, namely, from mother to child and through intravenous drug use, represented 3 per cent and 2 per cent of cases respectively. The epidemic is notable for its concentration in three regions, which together account for 66 per cent of cases notified throughout the country, with 25 per cent in the region of Souss-Massa, 21 per cent in the region of Marrakesh-Safi and 20 per cent in the region of Casablanca.

Viral hepatitis

There were 315 declared cases of viral hepatitis in 2010 and 244 in 2017. The notification rate was 1 per 100,000 population in 2010, which fell to 0.5 per 100,000 population in 2017. According to the Directorate of Epidemiology and Disease Control (DELM) of the Ministry of Health and Social Welfare, the incidence of hepatitis B per 100,000 population was 0.6 in 2015 and 0.5 in 2016 (SDG indicator 3.3.4).

COVID-19

The first case of COVID-19 in Morocco was detected on 2 March 2020, and a public health emergency came into force on 20 March 2020.

On 7 April 2021, the total number of cases of COVID-19 infection was 499,688. The cumulative incidence was therefore 1,374.1 per 100,000 population, and the mortality rate was 24.5 per 100,000 population. Unfortunately, 8,867 people have died since the start of the epidemic. The death rate was 1.8 per cent and recovery rate 97.3 per cent. On 26 July 2021, the cumulative total of cases was 581,477, including

9,611 deaths. Morocco began to vaccinate against COVID-19 on 29 January 2021. On 26 July 2021, the number of people who had received a first dose was 12,061,160, and the number who had received a second dose was 9,864,912. Morocco has double- and single-dose vaccines available.

Like the rest of the world, Morocco has had to deal with an unprecedented situation. The health authorities have encountered difficulties with human and material resources. Testing mechanisms and laboratory capacity were limited, as were health-care staff and specialists in epidemiology and crisis management. Other difficulties have been encountered, notably relating to communicating and relaying information.

Morocco adopted an approach focused on several aspects, particularly health, involving monitoring the pandemic and its evolution and strengthening basic health-care facilities. The “3-T” strategy based on “Test, Treat and Trace” has been at the heart of the response. The Ministry of Health and Social Welfare has drawn up a national strategy for monitoring and responding to the SARS-CoV-2 infection based on the following elements:

- Surveillance and monitoring activities for the early detection of cases;
- Surveillance, epidemiological case studies and contact tracing;
- Treating infection and controlling infection through isolation;
- Governance and coordination through intersectoral coordination and the mechanism comprising the National Centre for Emergency Operations in Public Health/Regional Centres for Emergency Operations in Public Health/Emergency Response Team (CNOUSP-CROUSPs-EIR);
- Information and communication based on communicating with the general public, advice for travellers, awareness-raising and training for health-care professionals.

Foodborne diseases

On average, 100 community outbreaks of foodborne disease were declared annually between 2013 and 2019. In less than 1 per cent of the outbreaks, water was identified as the source. In 2019, 714 people fell ill as a result of a community outbreak of foodborne disease.

The number of community outbreaks of foodborne disease appears stable. An annual average of 101 outbreaks has been recorded over the past five years.

Around 60 cases were recorded for each outbreak (minimum of 2 and maximum of 306 cases). During the period studied, 40.3 per cent of cases were treated in hospital and the death rate was 0.28 per cent. The distribution of community outbreaks recorded between 2015 and 2019 shows the largest number were households in the regions of Fès-Meknès, Souss-Massa and Casablanca-Settat.

In contrast, few such outbreaks were notified by the regions of Laâyoune-Sakia El Hamra, Dakhla-Oued Eddahab and Guelmim-Oued Noun. Over the same period, 63 per cent of community outbreaks of foodborne disease were recorded in urban areas. In addition, 52 per cent of outbreaks were declared in domestic settings and 48 per cent in communal settings.

Vector-borne diseases

Three vector-borne diseases are monitored in Morocco – malaria, bilharzia or schistosomiasis and leishmaniasis.

WHO declared Morocco to be free of malaria in 2010. SDG indicator 3.3.3 has therefore been attained in Morocco. However, the principal vector of malaria, *Anopheles labranchiae*, and other vector species, especially *Anopheles sergentii*, are still present in relatively large concentrations in almost all geographical areas of the country. Between 300 and 500 cases imported from abroad are recorded annually and, consequently, there is the fear the disease will re-emerge.

Schistosomiasis has been eradicated since 2005, and the country is preparing to file for certification of elimination. The species of freshwater mollusc *Bulinus truncatus* has been identified as the intermediate host implicated in transmission of schistosomiasis.

Three forms of leishmaniasis are rife in Morocco:

- Hypoendemic visceral leishmaniasis (VL), which is caused by *Leishmania infantum* and is widespread in the northern provinces situated in the Rif and pre-Rif mountains;
- Cutaneous leishmaniasis (CL), caused by *Leishmania tropica*, which affects the central provinces and those on the western slopes of the Atlas mountains;
- Zoonotic cutaneous leishmaniasis (ZCL), caused by *Leishmania major*, whose reservoir host is the rodent *Meriones shawi* and which is transmitted in

an endemo-epidemic way in the regions of the south; the principal vector species of leishmaniasis most commonly found nationally are *Phlebotomus sergenti* and *Phlebotomus papatasi* for CL/ZCL and *Phlebotomus perniciosus* and *Phlebotomus longicuspis* for VL.

During the period 2010–2020, 56,133 cases of indigenous leishmaniasis were reported; 31,622 (57 per cent) involved ZCL, 23,434 (41 per cent) CL and 1,077 (1.92 per cent) VL.

The annual evolution in recorded cases of CL and VL reveals a slight fluctuation in their respective average values of 2,130 and 97 cases per year. However, the fluctuation is more noticeable for ZCL, with an approximate average value of 2,874 cases per year. Mapping of annual average incidences per 100,000 population reveals little change for CL and VL for the period 2010–2020, while ZCL shows two epidemic spikes with fairly high incidences during two different periods, in 2010 and 2018, whereas the incidence was low during the periods 2012–2015 and 2019–2020. During the period 2014–2018, the number of cases of ZCL quadrupled, rising from 2,555 cases to 10,998 cases after prevention and elimination activities (which form part of integrated vector management (IVM)) were scaled back.

Other internationally significant vector-borne diseases – such as dengue fever, chikungunya and zika – could potentially emerge in Morocco, given an existing favourable biotope, the country's geographical location and its trade, maritime shipping and air links with many territories around the world. As part of the prevention of the introduction of the Zika virus disease, in 2017, an entomological survey was carried out. This survey showed the presence of the *Aedes Albopictus* vector in the Rabat region.

Venomous snake bites and scorpion stings

In 2016, 348 cases of venomous snake bites were reported. Four deaths were recorded, equivalent to a mortality rate of 1.14 per cent (the mortality rate in 2015 was 3.44 per cent).³⁶⁴ During 2017, the Poison Control and Pharmacovigilance Centre of Morocco (CAPM), under the DELM of the Ministry of Health and Social Welfare, was notified of 408 cases of snake bites, resulting in a mortality rate of 1.96 per cent.

In 2018, CAPM recorded 26,069 cases of poisoning from scorpion stings, representing an incidence rate of 77.1 per 100,000 population. Scorpion stings are the

³⁶⁴ www.capm-sante.ma/uploads/documents/38.pdf; www.sciencedirect.com/science/article/abs/pii/S2352007818302208.

leading cause of poisoning in Morocco. Children under 15 years represented 24.6 per cent or 6,415 cases of scorpion stings (incidence of 71.54 per 100,000 children). Nine per cent of stings involved poisoning; simple stings accounted for 91 per cent of cases. During 2019, CAPM was notified of 44 fatal scorpion stings, an overall mortality rate of 0.16 per cent.³⁶⁵

Other

The proportion of women aged between 15 and 49 years making their own informed decisions on their sex life, the use of contraceptives and reproductive health care declined from 47 per cent in 2009 to 25.1 per cent in 2012, falling further short of the 2030 target of 100 per cent (indicator 5.6.1).

The proportion of women of childbearing age, namely between 15 and 49 years, using modern family planning methods was 58 per cent in 2018, showing a slight increase on the 56.7 per cent recorded in 2010 (SDG indicator 3.7.1). The birth rate among adolescents aged 10–14 years and 15–19 years per 1,000 adolescents in the same age group was 32 births per 1,000 adolescents in 2010, dropping sharply to 19.4 births per 1,000 adolescents in 2018 (SDG indicator 3.7.2).

Regarding SDG target 3.8 (achieve universal health coverage), coverage of essential health services (SDG indicator 3.8.1) was 59 per cent in 2016 and rose to 68.8 per cent in 2019, still far short of the target of 100 per cent and therefore an ongoing major public health issue for the Moroccan population. In 2014, the percentage of the population devoting a proportion of their expenditure or household income to health-care services at a rate greater than 10 per cent of household expenses (SDG indicator 3.8.2 A) was 13.4 per cent. For 2 per cent of the population, the rate was more than 25 per cent of household expenses (SDG indicator 3.8.2 B).

For SDG target 3.b, information is available for SDG indicator 3.b.1 only. The proportion of the target population who have been vaccinated in line with the national immunization programme was 90.9 per cent in 2011 and 94.5 per cent in 2018. The country is in a

good position to achieve its target of 95 per cent in 2030.

13.2 Health risks associated with environmental factors and environmental causes of morbidity and mortality

Air pollution (indoor and outdoor)

In 2009, air pollution was ranked fifth among the risk factors causing the greatest number of deaths and disabilities in Morocco. It dropped to sixth in 2019 and remains the primary environmental risk factor among those considered.³⁶⁶

In Morocco, the principal source of air pollution in urban areas is vehicle emissions. These emissions are composed essentially of nitrogen oxides (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO₂). Industrial emissions are the second major source of air pollution. The air pollution generated by industrial plants comes from phosphate extraction and processing, the agribusiness industry, leatherwork, textiles, construction and energy generation.

The most recent national report on air quality, in 2019, reported on 15 cities using data available for the period 2014–2018 taken from established measuring stations.

Various studies of the health impact of air pollution have been conducted in Morocco. These include the 1999 Casa-Airpol Study, the 2001 Mohammedia-Airpol Study and the Safi Eco-epidemiological Study. All showed the links between pollution and the health of the populations exposed. The 2015 Greater Casablanca Eco-epidemiological Study revealed a correlation between air pollution and impacts on the health of the population. The findings demonstrated a significant correlation between medical consultations by adults and children and the concentration of pollutants (O₃, NO₂, PM₁₀ and SO₂). An increase in the level of pollutants (moving from the first to third quartile) led to a significant increase in the average number of consultations for children under five years of age. At Aïn Sebaâ and Sidi Bernoussi to the east of Casablanca, consultations for pneumonia increased in line with raised concentrations of O₃ and NO₂.

³⁶⁵ https://rcc-pv.ma/wp-content/uploads/2020/06/Revue_Toxicologie_Maroc_n43_2019_Rapports-annuels.pdf.

³⁶⁶ www.healthdata.org/morocco?language=41.

Photo 13.2: Lakhdar Wadi



Photo credit: Department of Sustainable Development

The study “La Santé et la Pollution de l’Air, Objectif 3 de Développement Durable au Maroc” [Health and Air Pollution, Sustainable Development Goal 3 in Morocco], carried out in conjunction with the Environmental Health Division of the Ministry of Health and Social Welfare, reviews the extent to which SDG target 3.9 and target 11.6 relating to ambient air pollution have been reached.³⁶⁷ SDG indicator 3.9.1 was estimated to be 53 deaths per 100,000 in 2010, and the rate was similar in 2016. A decrease to 47 deaths per 100,000 was forecast for 2020, and a rate of 35 deaths per 100,000 is projected by 2030. Thus, in the 10 years between 2010 and 2020, the number of deaths attributable to air pollution was predicted to fall by just 11 per cent. In 2016, ambient air particles were responsible for almost 93 per cent of deaths attributable to air pollution, with indoor air pollution and ozone pollution representing 6 per cent and 2 per cent respectively. Regarding SDG indicator 11.6.2, the average level of particulate matter (PM_{2.5}), weighted in relation to the estimated population of Morocco in 2010, was 19.5 µg/m³. It reached 25.4 µg/m³ in 2016 before beginning to show a gradual decrease. It is estimated to fall to 24.3 µg/m³ by 2030. These values remain extremely high compared with the threshold values recommended in WHO guidelines (10 µg/m³, annual average of PM_{2.5}).

According to the 2017 study entitled “Estimating the Health Cost of Air Pollution: The Case of Morocco”,³⁶⁸ the average concentrations of PM_{2.5}, calculated on the basis of PM₁₀ measurements for the period 2012–2015, for the cities of Benslimane, Casablanca, Fès, Khouribga, Marrakesh, Mohammedia, Settat and Tangier, exceeded the WHO threshold values (10 µg/m³). The findings of this study indicate that air pollution was responsible for about 2,200 deaths in 2014. An important share (47 per cent) of adult deaths occurred in Casablanca, followed by Marrakesh and Tangier, with the principal causes of death being ischaemic heart disease, stroke and lung cancer. Over 70 per cent of these deaths were the result of ischaemic heart disease and stroke. The authors calculate that the age groups most affected were adults over 45 years of age, with the majority of these deaths the result of heart disease and stroke, and children aged 0–4 years, whose deaths were caused by acute respiratory infections. The study points out that other calculations, notably by the Institute of Health Metrics and Evaluation, conclude that deaths attributable to air pollution total 6,000 a year for the whole of Morocco.

Household exposure to PM_{2.5} resulting from burning solid fuel depends on living habits. The National Survey on Population and Family Health does not

³⁶⁷ www.isglobal.org/documents/10179/6224326/Publicaci%C3%B3n+contamianci%C3%B3n+aire+Marruecos/65cc76f7-1251-4fae-a203-85564ed5f5ac.

³⁶⁸ www.scirp.org/journal/paperinformation.aspx?paperid=79181.

provide information on the use of solid fuel for cooking by rural households. However, a 2015 study by the Department of Sustainable Development and UNDP indicates that 20 per cent of rural households were using wood for cooking in 2010.

In the absence of any indoor air measurements in Morocco, the study on the assessment of costs of air pollution: on the health in Morocco³⁶⁹ was based on WHO data from other countries to estimate the annual average concentration of PM_{2.5} within Moroccan rural households using solid fuel at 100 µg/m³. The total population exposed to PM_{2.5} of indoor air was estimated to be 2.4 million people in 2014. The mortality attributable to indoor air pollution in Morocco was estimated to be 1,350 in 2014, with almost 90 per cent of the deaths due to ischaemic heart disease, stroke or acute respiratory infections. The most affected age groups were adults aged over 55 years and children aged 0–4 years.

As regards tobacco consumption, which is a significant contributor to NCDs and is the principal – avoidable – cause of cancer, the national survey of NCD risk factors conducted in 2017 revealed that 13.4 per cent of Moroccans aged 18 years and over smoked tobacco. This consumption revealed a higher prevalence among 30–44-year-olds (13.8 per cent) and 45–59-year-olds (13.1 per cent), irrespective of whether they lived in an urban or rural area. Prevalence was lower among women (0.4 per cent) than among men (26.9 per cent). Regarding the prevalence of current tobacco consumption among people aged 15 years and older (comparative rates per age), more than 11 per cent of Moroccans in this age bracket were consuming tobacco in 2018 (SDG indicator 3.a.1). The most recent studies appear to show a decline in the prevalence of smoking. Among children aged between 13 and 15 years, the rate dropped from 9 per cent in 2010 to 6 per cent in 2016, and among adults the rate of 16 per cent in 2008 fell to 13.4 per cent in 2017.

Occupational exposure to passive smoking affects one quarter of the population. Passive smoking within households affects 16.5 per cent of the population, with a higher percentage (18.9 per cent) in rural areas than in urban areas (15.1 per cent).

Drinking water and sanitation

Access to drinking water in rural areas in Morocco is defined by a minimum service level of 20 l per inhabitant per day at a maximum distance of 500 m from each household. In urban areas, household connection to the main drinking water supply is at 94 per cent. The remainder of the population, located in peripheral, semi-urban areas, is supplied by standpipes or household mains connection.

In rural areas, the rate of access to drinking water has risen considerably in recent years, from 14 per cent in 1994 to 94 per cent in 2014. It reached 96 per cent in 2019, with around one third of households connected to the mains supply and two thirds accessing water via public standpipes. The proportion of the population using safely managed drinking water supply services reached 93 per cent in 2018 (SDG indicator 6.1.1). However, more than one third of the rural population does not have access to good quality water that meets the standards in force.

The incidence of waterborne diseases in Morocco has decreased considerably over the past 25 years. Since 1995, cholera has disappeared, and the number of cases of typhoid fever and viral hepatitis has fallen by more than 90 per cent. These improvements are linked to access to drinking water, improved water quality and better sanitation. However, infantile diarrhoea still occurs frequently, and work is under way to establish collaboration between the Environmental Health Division and the health services of the Ministry of Health and Social Welfare on this issue and to determine any links to water quality. Mortality from diarrhoea was 5.4 per cent in 2013. It has been established that waterborne determining factors are responsible for 50 per cent of mortality due to diarrhoea in Morocco. An estimated 540 deaths among children are attributable to diarrhoea caused by a lack of adequate drinking water supply, sanitation and hygiene. In addition, an estimated 5.9 million cases of diarrhoea per year among children under five years are due to waterborne determinants.³⁷⁰

According to the study “Water, Sanitation and Hygiene, Sustainable Development Goal 3 in Morocco”, carried out in conjunction with the Environmental Health Division of the Ministry of Health and Social Welfare, the annual number of deaths due to unclean water, inadequate sanitation and

³⁶⁹ Ibid.

³⁷⁰ <https://documents1.worldbank.org/curated/en/741961485508255907/pdf/105633-WP-P153448-FRENCH-PUBLIC-Moroc-Etude-CDE-Final-logo-Janv-2017.pdf>.

poor hygiene is estimated to be 1,730 in Morocco.³⁷¹ According to the most recent data in the WHO Global Burden of Disease (GBD) study conducted in 2019, approximately 860 deaths were attributable to unclean water, 520 deaths to a lack of access to hand-washing facilities and 350 deaths to poor sanitation. Thus, the difficulties in accessing drinking water, sanitation and hand-washing facilities represent the 14th most important risk factor for mortality in Morocco.

The 2016 WHO GBD study estimated that the mortality rate standardized for 100,000 people based on age and attributable to unclean water, deficiencies in the sanitation system and a lack of hygiene in Morocco had halved in 10 years. The mortality rate was 8.8 deaths per 100,000 in 2010 and was forecast to be 4.4 deaths per 100,000 in 2020. Based on this current trend, the rate should continue to fall to reach 2.3 deaths per 100,000 in 2030. The estimated prevalence of populations using sources of unclean or unimproved water in Morocco was 25 per cent in 2010 and 20 per cent in 2016, and was estimated to decrease further to 17 per cent in 2020 and 12 per cent in 2030. The estimated prevalence of populations using an unhealthy or unimproved sanitation system was 19 per cent in 2010 and 15 per cent in 2016, and was projected to fall to 11 per cent in 2020 and 6 per cent in 2030. The estimated prevalence of populations without access to hand-washing facilities was 28 per cent in 2010 and 24 per cent in 2016, and was predicted to fall to 22 per cent in 2020 and 16 per cent between now and 2030. The mortality rate attributable to unclean water, a deficient sanitation system and poor hygiene (inadequate access to WASH services) was 1.9 in 2019. The target for 2030 is 1.9 (SDG indicator 3.9.2). The country reports on the proportion of the population using (a) safely managed sanitation services and, especially, (b) hand-washing facilities with soap and water, with values increasing from 95.5 per cent in 2015 to 96.9 per cent in 2018 (SDG indicator 3.9.2).

In a 2018 report, based on a review of the situation in 2016, the Mediterranean Health Observatory examined how likely it was that Morocco would attain the SDGs. It points out that the three indicators relating to universal access to drinking water, a safe sanitation system and hand-washing facilities are far from achieving their targets. The report stresses that significant efforts have been made in the matter of drinking water and sanitation but work still remains to be done concerning access to hand-washing facilities.

Drawing on the WHO report, Health Profile 2015 Morocco,³⁷² the Observatory notes that the hygiene programme, housed within the Ministry of Health and Social Welfare, has not benefited from the financial resources required to enable it to support development in these sectors and that efforts are still needed to ensure the competent authorities view the hygiene programme as the third pillar of water, sanitation and hygiene.

Legionellosis is not a notifiable disease in Morocco. *Legionella* is a genus of bacteria that colonize natural and artificial water systems, given the right conditions for them to develop. These bacteria are the source of legionellosis, an acute and potentially fatal pulmonary infection. Transmission to humans is acknowledged as resulting from the inhalation of infected aerosols from aquatic environments. The principal sources of known human exposure to these bacteria are environmental. The sources of contamination most often implicated are installations that offer favourable conditions for the legionella bacteria to multiply in water and for them then to be dispersed in the form of aerosols. Such installations are principally hot-water supply systems (particularly showers), cooling towers and jacuzzi-type spas.

Few data are available on legionellosis in Morocco. INH devoted its Bulletin No. 8 in 2017 to this subject, issuing recommendations that included making legionellosis a notifiable disease, establishing an enhanced surveillance programme, raising the awareness of health professionals and optimizing the design of hot-water supply systems.³⁷³

The risks associated with legionellosis in hotels are taken into account in the 2020 Circular of the Ministry of Health and Social Welfare on strengthening detection and control of legionellosis. This document was issued as a supplement to the 2000 Circular of the Ministry of Health and Social Welfare on controlling legionellosis. The 2020 Circular asks health professionals to report any case without delay to the provincial delegation of the Ministry of Health and Social Welfare. The declaration of a case is followed by epidemiological and environmental investigations. It presents the verifications and preventative actions to be implemented within the establishment concerned and recommends a search for the presence of legionella in its hot water system annually, but this is not a regulatory obligation. To prevent the risk of legionellosis infection, preventative inspections of

³⁷¹ www.isglobal.org/documents/10179/6224326/Publicaci%C3%B3n+agua%2C+saneamiento+e+higien+en+Marruecos/Oae1d066-7436-4607-86a4-ee43d2ef915e.

³⁷² https://applications.emro.who.int/dsaf/EMROPUB_2016_EN_19275.pdf?ua=1.

³⁷³ http://inh.ma/wp-content/themes/twentythirteen-child/Documents_PDF/Bulletin_INH_N8.pdf.

hotel buildings are regularly carried out to detect any non-compliance and to propose any corrective measures. Details are not provided of how checks are carried out on this self-monitoring system. No mention is made of controlling the risks associated with legionellosis in the case of cooling-tower-type installations in industry and elsewhere.

Bathing water

In the context of Blue Flag certification, Moroccan standard NM 03.7.199, which was transposed from European Directive 2006/7/EC concerning the management of bathing water quality, replaced NM 03.7.200 (from European Directive 76/160/EEC) in 2014. This new standard classifies bathing water according to water quality measured over the previous four consecutive years and involves drawing up bathing profiles. In cases where the competent authorities are unable to produce profiles to check bathing water quality, they must comply with NM 03.7.200.

Ten initial bathing water profiles were produced in the first instance in 2013. In 2019, this figure had risen to 144 bathing profiles, 17 of which were updated to take account of the new standard. Thus, according to 2019 data, 85 per cent of bathing sites are covered by a profile. The production of bathing profiles represents important progress in the management of bathing water and in the control of health risks since the last EPR.

The number of bathing sites included in the national programme on bathing water quality monitoring has gradually increased over 20 years. In 2020, 175 beaches were covered by the national programme. Monitoring is conducted fortnightly between May and September in addition to a baseline survey in February/March.

Since 2019, bathing water quality has been evaluated in line with NM 03.7.199 on the basis of two microbiological parameters which are markers of faecal contamination: *Escherichia coli* and intestinal enterococci. Four levels of quality are defined – excellent, good, adequate and inadequate, the last being for bathing water that does not meet the standard.

In 2019, 461 stations located at 175 beaches were responsible for 4,976 samples and analyses. Of the 422 stations obtaining sufficient samples for classification, 370 were declared as complying with the microbiological quality set out in NM 03.7.199, and 52 stations located at around 30 beaches were declared to be non-compliant. Ten stations were declared non-

compliant in 2013, nine in 2016 and seven in 2018. This disparity results from different methods of calculation contained in the new standard being applied. These revised methods take account of the results from the three preceding years rather than the results for a single season. Thus, in 2018, seven stations did not comply with NM 03.7.200, whereas under the new standard NM 03.7.199, the figure rose to 49 non-compliant stations. Overall, since 2014, 12.32 per cent of the monitoring stations were found to be non-compliant for bathing according to NM 03.7.199. The non-compliant stations are spread over six regions.

Furthermore, some stations that failed to comply in 2019 were already non-compliant in 2014, 2016 or 2018. This applies in particular to the beaches of Jbila III (Tangier-Asilah Prefecture), Miami (Larache Province), Aïn Atiq (Skhirat-Témara Prefecture), Oued Merzeg (Nouacer Province) and the S1 stations at several beaches in Casablanca Prefecture. However, Tangier City and Markala beaches, which did not comply in 2014–2015, no longer appeared on the list of non-compliant stations in 2019.

Instances of non-compliance may be attributed to chronic or one-off pollution from the sanitation systems – e.g., septic tanks, water-treatment plant failures, poor connections and bypass – and to the density of summer visitors combined with a lack of sanitation facilities.

Bathing water quality continues to be significantly affected by wastewater discharge, which is piped directly or indirectly towards beaches. To limit the impact, different sanitation measures have been taken, particularly in the context of the PNAM. Water quality and beach management involves other actors beyond those at the bathing site, as pollution problems may originate in sectors upstream. Coordinating these actors is one of the keys to controlling the sources of pollution at bathing sites, and bathing profiles are a good management tool. The administration does not make clear the methods used – how often and by what means, for example – to track the implementation of the bathing profile action plans.

A technical guide, “Health, Hygiene, Security and Accessibility”, produced by the Mohammed VI Foundation for Environmental Protection as part of its Clean Beaches Programme, assists local authorities in their organization of sanitation, security and inspection facilities relating to beach cleanliness regulations.

No data are accessible on drownings. According to one media report, during the first three months of summer

2019, 8,159 incidents were recorded for all the beaches in Morocco. These incidents led to 52 deaths from drowning, with the rescue services saving 8,099 lives. A further seven people were reported missing.³⁷⁴

The public has access to the IPlages app, which can be used to locate a bathing site and be informed of its quality, facilities (e.g., toilets and showers) and services (e.g., lifeguard station and first aid post).

Blue Flag eco-certification is contingent on the level of compliance of beach organization and management, with the emphasis on criteria that must be met relating to the overall environment, water management, waste management and environmental education. Since 2002, this programme, which is managed by the Mohammed VI for Environmental Protection, has been supported by progress made by the Foundation's Clean Beaches Programme, the objective being to secure certification for the maximum number of beaches. Of the 89 beaches registered with the Clean Beaches Programme in 2016, 22 beaches received Blue Flag certification. In 2020, 39 beaches applied and 26 of them met the required criteria. The number of beaches involved in the Clean Beaches Programme has grown rapidly, from 12 beaches in 1999 to 104 in 2019.

Radiation

The health risk posed by radon has not been assessed by the Moroccan health authorities.

A page with information on the dangers to health posed by exposure to the sun is displayed on the Ministry of Health and Social Welfare website.

Noise and vibration

Morocco has not developed noise mapping or produced an inventory of noise pollution. Data on the impact on health of noise pollution specific to Morocco are either unavailable or non-existent.

Food safety and nutrition

During 2019, CAPM was notified of 1,371 cases of foodborne illnesses, 55.8 per cent of which were community cases. The food vectors most frequently implicated were meat and meat products (11.3 per cent), dairy and similar products (6.8 per cent) and fruit and vegetables (4.5 per cent). In 64.3 per cent of cases the product was not specified. The average age of the food poisoning patient was 23.4 ± 18.4 years,

with adults representing the most common age range (52.4 per cent) followed by children (20.27 per cent). The ratio of men to women was 0.8:1.0. Most foodborne illnesses occurred in urban areas (63.7 per cent) and at home (33.5 per cent). In 35.8 per cent of cases, the poisoning was moderately serious and in two cases it was fatal. The mortality rate was 0.14 per cent.³⁷⁵

Food safety control analyses are carried out by the public health laboratories of the Ministry of Health and Social Welfare. Nearly 3,000 samples are analysed per year; analyses are also carried out on food handlers, and the rate of non-compliance obtained is in the order of 1–2 per cent.

Within the framework of food health control, 8,541 food samples were analysed in 2016 and 9,248 in 2017. The bacteriological non-compliance rate on these samples was 20 per cent in 2016 and 21 per cent in 2017. In 2017, the highest non-compliance rates were obtained for meat and meat products (39 per cent), vegetables and raw vegetables (36 per cent), bottled drinks (34 per cent), fruits (33 per cent), bakery products (23 per cent), ready meals (16 per cent) and dairy products (14 per cent). The number of samples analysed varies from region to region and depends on the activity of the provincial hygiene units and the means available.

Surveillance of chemical contaminants in fish products was first introduced in 2006. The average mercury content in 869 samples of fish products landed on both Moroccan coasts between 2010 and 2016 was 0.073 mg/kg, below the statutory limits in force of 1 mg/kg for large predatory fish and 0.5 mg/kg for non-predatory fish. The mercury content of fish landed at different Moroccan ports varied from port to port. The species of fish containing the highest levels of mercury were skipjack tuna (0.314 mg/kg), mullet (0.195 mg/kg), dogfish (0.192 mg/kg), shark (0.182 mg/kg), swordfish (0.173 mg/kg), squid (0.172 mg/kg) and eel (0.133 mg/kg). The lowest levels of mercury were found in sardinella (0.012 mg/kg), red mullet (0.023 mg/kg), common pandora (0.026 mg/kg), capelin (0.037 mg/kg) and sardine (0.038 mg/kg). Those species in which mercury was not detected were umbrina, dentex and coral grouper.

A study of the occurrence of mercury in Moroccan coastal fishing products reports a year-on-year increase in the average levels of mercury in all fish products landed in Morocco during the period 2010–2016, sometimes rising fivefold, such as from 0.02

³⁷⁴ <https://m.le360.ma/societe/bilan-macabre-les-plages-du-royaume-ont-fait-53-morts-196875>.

³⁷⁵ www.capm-sante.ma/uploads/documents/81.pdf.

mg/kg in 2010 to 0.127 mg/kg in 2016. This increase could be explained by the growth in industrial activities in Morocco from year to year, coupled with the increase in discharge from these. The study emphasizes the need for collaboration among the various national and international actors in order for action to be taken on the sources of mercury.³⁷⁶

The Department of Sustainable Development has conducted a study aimed at evaluating the health risks linked to ingesting cadmium in seafood from the Atlantic coast at Jorf El Asfar. Analysis of the findings, which are based on certain hypotheses, has led to the conclusion that significant risk indicators exist in the following specific cases:

- For daily consumption of fish with the maximum concentration of cadmium, the risk indicators exceed the threshold for adults;
- For daily consumption of fish with an average concentration of cadmium, the risk indicators exceed the threshold for children.

Chemical safety

CAPM is notified of cases of heavy metal poisoning; there were 5 cases in 2015, 6 in 2016, 10 in 2017 and 6 in 2018. A survey of lead, mercury and cadmium use in Morocco was conducted in 2010 by the Department of Sustainable Development. The survey revealed that these metals are principally used in the following fields:

- Lead: production of lead from fusion, battery and lead foil manufacture; and paint production;
- Mercury: chemical and pharmaceutical industry, battery manufacture, and production of electrical appliances and measuring and regulating appliances;
- Cadmium: chemicals industry and battery manufacture.

Lead

The presence of lead in the human organism, and specifically in children, remains a public health concern, given the potential impact on child neurological, reproductive and behavioural development and on the central nervous system in

particular. Even low levels of lead impregnation can have a harmful effect on a child's health.

In 2019, CAPM analysed 31 blood samples for lead, including eight that exceeded the toxicity threshold. A blood test to determine the blood lead level (BLL) was requested in the context of neurological problems that indicated the possibility of chronic lead poisoning. The highest concentration of 498 µg/l was discovered in a 41-year-old man who had suffered occupational exposure to lead.

The various studies undertaken in Morocco have been included in many literature reviews, notably, those produced by CAPM in 2014 and 2016, the 2017 World Bank Report on the Cost of Environmental Degradation in Morocco³⁷⁷ and a 2018 academic study of lead poisoning.³⁷⁸ All emphasize the multiplicity of sources of exposure to lead in Morocco and demonstrate their impact on the health of the Moroccan population. These studies regularly warn of the need to take account of this public health issue and develop ways of preventing and limiting exposure (box 13.1).

The 2017 World Bank report highlighted the issue of the processing of used batteries by the informal sector, where extraction is done by simple combustion in small foundries with a high risk of exposure for both the workforce and surrounding populations. For example, workers being exposed to lead can result in other family members, particularly children, being poisoned, because of the lead dust carried home on skin and clothing. Simple preventative measures ensuring that workers shower and change clothes before returning home have proved effective. To limit pollution and exposure to lead in battery processing, the Department of Sustainable Development signed a partnership agreement in 2014 concerning the collection, transporting, sorting and disposal of used batteries and based on broadening the scope of battery producers' responsibilities.

Cumulative effects may be seen from several sources – environmental, industrial, small manufacturing, housing, diet and lifestyle – and exposure routes (inhalation and ingestion) may be implicated simultaneously. Lead can also accumulate in the surroundings, in the earth, water and air, and can enter the food chain via water and vegetables.

³⁷⁶ www.capm-sante.ma/uploads/documents/28.pdf.

³⁷⁷ <https://documents1.worldbank.org/curated/en/741961485508255907/pdf/105633-WP-P153448-FRENCH-PUBLIC-Maroc-Etude-CDE-Final-logo-Janv-2017.pdf>.

³⁷⁸ https://revues.imist.ma/index.php/SMETox_Journal/article/download/11782/6662.

Box 13.1: Some studies on exposure to lead and the impact on the health of populations, particularly children

Shaimi and others (2014)* studied the exposure to lead around an industrial site contaminated with lead. The study showed that the average BLL of participants in the exposed population in Casablanca (n=282) was significantly higher than that of non-exposed participants in Rabat (n=191). The study indicates that these differences could be linked to exposure to lead particles emitted by the foundries in the neighbourhoods of Aïn Sebaâ and Sidi Bernoussi and by the battery manufacturing companies in the neighbourhood of Sidi Bernoussi.

S. Maidoumi and others (2021) ** evaluated the impact of exposure to lead on the cognitive function of children aged between six and 10 years who attended school in the semi-urban area of Saada close to a mining site. The average BLL measured on nail samples from the children was close to 10 times higher than the selected baseline value (3.7 µg/g). Of the 78 children, 75 (96.2 per cent) presented with a lead overload and associated visual attention disorders.

S. Bouftini and others (2016) *** assessed the prevalence of lead poisoning in children living in the small manufacturing and industrial zone of Aïn Nokbi in Fès. The study showed a high prevalence of lead poisoning (21.1 per cent) in this group. The clinical and biological tests conducted on the 19 cases of lead poisoning within the exposed population revealed disorders such as anaemia, hypocalcaemia and iron and magnesium deficiency. The origins of this poisoning may be industrial, combined with environmental factors. The authors stress that treatment of cases of lead poisoning and corrective and preventative measures involving the relocation of the industrial site have helped reduce the prevalence of lead poisoning in the population being studied (BLL will be ascertained again nine months after the study's conclusion).

Sources:

* www.sciencedirect.com/science/article/abs/pii/S2352007814000286.

** www.researchgate.net/publication/352256580 Etude de l'effet du plomb sur les fonctions cognitives des enfants scholarises.

*** www.capm-sante.ma/uploads/documents/30.pdf.

Photo 13.3: Nomadic life, Khenifiss National Park



Photo credit: Department of Sustainable Development

A 2017 study of solvent-based lead paints for domestic use in Morocco showed that 39 per cent of the 33 pots of paint analysed contained concentrations of lead that exceeded 90 parts per million (ppm).³⁷⁹ Furthermore, 18 per cent (six pots) contained concentrations above or equal to 10,000 ppm. The paint showing the highest concentration, 140,000 ppm, was manufactured locally in Oujda. The study indicates that 61 per cent of paints tested had concentrations of lead below 90 ppm, highlighting the fact that the technology for producing lead-free paint exists in Morocco. The study also notes that the degree of hazard posed and the means of preventing the risk of exposure to lead are generally not indicated on the labels of the pots of paint tested. The study concludes with recommendations to: (i) ban the manufacture, importing and exporting and sale of paints with lead concentrations above 90 ppm; (ii) promote production of lead-free paints; and (iii) raise consumer awareness of the risks associated with lead paint and encourage the use of lead-free paint within buildings used by young people.

Since 2020, Moroccan standard NM 03.3.318 has set the lead limit in paints at 90 ppm. Lead paints continue to be produced, marketed and used in Morocco.

One-off prevention measures have been taken, notably in the form of the first national day to raise awareness of lead poisoning on 25 October 2016. This event was backed by publication of a special issue of *Toxicologie Maroc* (No. 30, 2016). Discussions held on the day led to 10 recommendations, relating particularly to a better understanding of exposure to lead, enhancing epidemiological monitoring, raising awareness and communicating on the subject, establishing a national strategy to eliminate lead poisoning and strengthening related regulations. Lectures were organized in October 2019 as part of doctoral training by the Centre for Doctoral Studies at the University of Ibn Tofail³⁸⁰ in collaboration with the Ministry of Health and Social Welfare and the International Pollutants Elimination Network (IPEN) to coincide with International Lead Poisoning Prevention Week (ILPPW).

Lead poisoning is not an officially notifiable disease. Annual consolidated, epidemiological data on lead poisoning are therefore not available.

Mercury

The dental sector reportedly uses almost 792 kg of mercury per year. This figure is based on an estimated

3,300 dentists using 41 g of amalgam per month containing approximately 50 per cent mercury.

The 2017 study by Abdelkarim Manyania and others (2020)³⁸¹ of dentists in the region of Rabat and Kenitra revealed that 90 per cent of respondents were unaware of the regulations governing the management of MPW (Law No. 28-00). Almost half the respondents disposed of sharps waste in public rubbish bins and just over one quarter had a contract with companies that processed health-care waste. The median value of dental amalgam used in dental surgeries was 41 g per month. Just one third of respondents had a dental amalgam separator and only 7 per cent used specific containers for disposing of amalgam waste. It should be noted that 96 per cent of respondents were unaware of the Minamata Convention on Mercury. The study lays particular emphasis on a lack of specialist companies for managing MPW in Morocco as well as on the shortcomings in awareness-raising and training of dental practitioners.

The Ministry of Health and Social Welfare Circular No. 196 DMP/00 of 6 October 2010 advised the decision to withdraw certification and registration of mercury thermometers and ban their marketing. According to a press article seven years later, this type of thermometer still existed in retail outlets and, notably, in some pharmacies and drugstores.

A study day on the role of the health sector in Morocco in implementing the Minamata Convention, organized by the Ministry of Health and Social Welfare, was held on 27 April 2017. The event was designed to bring together the different sectors involved in implementing the Minamata Convention in Morocco.

Within the framework of the Minamata Convention, the country has benefited from GEF financing for the realization of a project which aims to strengthen the national decision-making mechanism with a view to the ratification of the Minamata Convention. As part of this project, a study was carried out which showed that the main sources of mercury release include:

- General consumption of mercury in products (lamps, thermometer);
- Waste incineration and open burning;
- Cement production;
- Uncontrolled landfills;
- Coal combustion and other uses of coal;
- The application, use and disposal of dental amalgam fillings.

³⁷⁹ <https://ipen.org/sites/default/files/documents/ipen-morocco-lead-report%20final.pdf>.

³⁸⁰ <https://ced.uit.ac.ma/>.

³⁸¹ <https://doi.org/10.1016/j.toxac.2019.12.003>.

The results of the inventory drawn up within this framework showed that the overall release of mercury from all economic activities for the reference year of 2015 is estimated at 18,690 kg. Following the analysis of the impacts of mercury on the three natural compartments involved in the mercury cycle (air, water and soil), and according to the information and data collected as part of this study, no exceedance of the regulatory limit values discharge and emission has not been observed.

Pesticides

There are many routes of exposure to pesticides, in particular, inhalation and ingestion via foodstuffs or accidental ingestion. A study of the epidemiological profile of pesticide poisoning in children in Morocco³⁸² provides contextual factors for the period 2008–2014, during which 1,745 cases of pesticide poisoning in children aged 14 years and younger were reported, equivalent to an annual average of almost 124 cases. The average age of the children involved was 4.9 ± 4.3 years, and 63 per cent of poisonings involved children aged between one and four years. Approximately 67.4 per cent of cases occurred in an urban setting. The poisonings were principally accidental (91.3 per cent) and virtually all the children were poisoned at home (96.9 per cent). Insecticides were most frequently implicated, accounting for 51.8 per cent of cases.

Rat poison represented a significant percentage of fatalities (1.5 per cent). The poisoning was clinically manifested in the gastrointestinal system and nervous system in a significant percentage of cases – 38.7 per cent and 37.8 per cent, respectively. Of the 1,355 cases in which the evolution of the poisoning was monitored, 21 deaths were recorded, equivalent to a mortality rate of 1.5 per cent. The study concludes with the need to regulate the purchase of pesticides in Morocco.

A study of occupational pesticide poisoning in Morocco retrospectively analysed all cases of poisoning linked to occupational exposure to pesticides notified to CAPM between 2007 and 2011.³⁸³ A total of 112 cases of occupational pesticide poisoning were reported. This figure represents 2.9 per cent of all pesticide poisonings notified during the period. According to the data submitted, the victims were most often male (57 per cent) with an average

age of 28.1 ± 11.8 years. Almost 48 per cent of recorded cases resulted from exposure through inhalation and 42.7 per cent from ingestion orally. The risk was principally linked to the use of insecticides. The victims presented various signs of poisoning during clinical examination, and a whole range of neurological, digestive, respiratory and cardiovascular disorders was encountered.

The population has not been made aware of the danger posed by these products and of the preventative measures to take to avoid accidents in the home. Highly toxic pesticides are subject to monitoring by the relevant authorities, however, to identify those that pose a danger to health or the environment. By 2019, this had resulted in the withdrawal of 33 active materials.

Persistent organic pollutants

In 2009, data on contamination by PCBs were inadequate and did not enable a proper health assessment to be conducted of the risks involved. The data available indicated that there were frequent emissions and that PCB oils represented a clear threat to human health and to the quality of the environment in Morocco.³⁸⁴ Epidemiological data and the impact on food-chain products in Morocco are not known.

Also, as part of the National POPs Monitoring Plan resulting from the GMP 2 – Africa project under the Stockholm Convention, implemented by the LNESP and which aims to strengthen the capacities of laboratories for the sampling and analysis of POPs in the air, breast milk, and in matrices of major national interest such as fish, plants or sediments, and after the various surveys and analyzes carried out on breast milk, it was noted that the majority of POPs products are not detectable in the sample analyzed with the exception of DDT, which testifies to an old application of the product.

In 2010, stocks of the product DDT, considered a persistent organic pollutant, were eliminated under the Stockholm Convention. Nearly 40 tons were affected by this disposal operation. Stocks of obsolete pesticide products are being eliminated as part of a project led by FAO and ONSSA. A total of about 750 tons was inventoried, which includes pesticides for agricultural use and pesticides for health and public hygiene use.

³⁸² www.sciencedirect.com/science/article/abs/pii/S2352007819301131#:~:text=Les%20intoxications%20sont%20accidentelles%20dans,1%C3%A9talit%C3%A9%20avec%201%2C5%20%25.

³⁸³ www.sciencedirect.com/science/article/abs/pii/S1775878518305472.

³⁸⁴ www.environnement.gov.ma/fr/strategies-et-programmes/prevention-risques/192-programme-de-gestion-securisee-des-pcb-au-maroc.

Housing

In 2015, 61 per cent of inhabitants in urban areas owned their own home, compared with 91 per cent in rural areas. While 99 per cent of urban households had access to electricity, 93 per cent of rural households did so. Those households without access to electricity mainly used gas or candles for lighting, with all the attendant risks, such as fire, poor indoor air quality and burns. This urban–rural disparity was even more marked in access to running water, with 99.1 per cent of urban households benefiting from such access but just 76 per cent of rural areas doing so. In addition, just 42 per cent in rural areas were connected to the drinking-water supply. Household appliances also reflected this disparity: 94 per cent of urban homes had a refrigerator, compared with 77 per cent in rural areas. Likewise, 72 per cent of urban households were equipped with a washing machine, compared with 26 per cent of rural households.³⁸⁵

Some Moroccan conurbations have seen shanty towns and informal settlements develop on their outskirts. Major operations to gradually reduce the extent of shanty towns and upgrade informal neighbourhoods have been undertaken and are ongoing. In 2019, 59 cities were declared slum free, of the 95 originally earmarked, while 420,000 households continued to live in a shanty town. At the outset, people were rehoused in the same location, but over time this approach has shifted, and households are now resettled on the outskirts of major cities. These new neighbourhoods do not have the necessary facilities and infrastructure, such as schools, health centres and shops, and thus contribute to the physical and social isolation of these populations.³⁸⁶ Furthermore, 43,697 dangerously dilapidated homes were recorded in 2012, 42.5 per cent of them in the historic medinas. Unsanitary housing affects not only specific neighbourhoods; it also exists in historic centres, former mining and/or industrial towns and rural areas. The figures for derelict housing are not available.

A 2014 study by Agandhous and others³⁸⁷ looked at 238 deaths from carbon monoxide (CO) poisoning reported between 1991 and 2014. Deaths from CO accounted for 13 per cent of all deaths notified to CAPM during this period. The average age of victims who died from CO poisoning was 30 ± 19 years. The deaths were principally among adults (64.7 per cent), followed by children (12.9 per cent), adolescents

(9.8 per cent), toddlers (7.6 per cent), older people (3.6 per cent) and infants (1.3 per cent). In 98.7 per cent of cases, the poisoning was accidental and 87 per cent occurred at home. The cold months accounted for the majority of incidents, with 55 per cent happening in winter. The urban population was most affected (66.5 per cent of cases), as was the region of Meknès-Tafilalt (14.3 per cent), followed by the regions of Fès-Boulmane (13.4 per cent) and Tangier-Tétouan (13 per cent). The study emphasized that 238 was an underestimate of the number of fatal cases of CO poisoning over 23 years in Morocco.

During 2019, 1,637 cases of poisoning by toxic gas were recorded, 11.19 per cent of all declared poisonings. CO poisoning predominated, accounting for 1,306 cases and 79.8 per cent of all toxic gas poisonings. Next came butane gas poisoning (15.74 per cent). Most cases of gas poisoning (86.8 per cent) occurred as the result of an accident and many (29.8 per cent of cases) were in urban and domestic settings. The average age of the victims of poisoning was 26.6 years; 59.9 per cent of cases were adults and 17.4 per cent were children. Six deaths from gas poisoning were recorded.³⁸⁸

The first EPR recommended that the then Ministry of Housing, Urban Planning and Urban Policy, in collaboration with the then Ministry of Health and the then Ministry of Energy, Mines, Water and Environment, develop a strategy on how to effectively address the health and environmental consequences of urban sprawl and suburban development (Recommendation 10.5). Actions and studies have already been undertaken, such as the implementation of the Cities without Slums Programme. However, by the end of 2021, there is no relevant strategy.

Asbestos

Asbestos is still used as a building material in Morocco. According to the latest available data, in 2019, Morocco imported 572 tons of asbestos. Since 2011, asbestos has been included among those products requiring an import and export licence. Order No. 2916-11 of the Minister of Foreign Trade, dated 12 October 2011, sets out the list of goods subject to import and export restrictions on quantities (Official Bulletin No. 5996, 17 November 2011).

³⁸⁵ www.mhvp.gov.ma/wp-content/uploads/2020/01/LHABITAT-EN-CHIFFRES-2017-2018-VF.pdf.

³⁸⁶ Ghalia Kadiri, “Au Maroc, le long abandon des bidonvilles” [The Slow Abandoning of Slums in Morocco], *Le Monde*, 5 January 2019.

³⁸⁷ www.sciencedirect.com/science/article/abs/pii/S2352007817301063.

³⁸⁸ www.capm-sante.ma/uploads/documents/81.pdf.

Data relating to asbestos in buildings are not available. According to an article published in 2015, however, almost 6,000 school classrooms in Morocco are constructed using asbestos.³⁸⁹ These schools are located particularly in rural areas where prefabrication is widely used in the construction of school premises. Data relating to a census of schools and other public buildings containing asbestos are not available. There is no evidence of measures to monitor the deterioration of the asbestos within these buildings or within public buildings in general. Nor are the methods for the dismantling, removal and disposal of asbestos set out.

Active or abandoned mining and industrial sites

Little recent information is available concerning the health of resident populations at abandoned or active

mining sites. Since July 2015, Morocco has possessed a Mining Code that incorporates the principles of sustainable development. According to the Code, mine operators are obliged to produce an EIA and to set out the environmental acceptability of any mine, as well as a plan for its eventual closure. At present, the rehabilitation of abandoned mines is not considered part of the Mining Code.

In 2018, according to the Canadian International Development Research Centre,³⁹⁰ Morocco had more than 200 mining sites. Without appropriate rehabilitation, these sites pose significant health and environmental problems for the surrounding communities. Examples of the health impacts on resident populations at abandoned mining sites are given in box 13.2.

Box 13.2: Examples of unrehabilitated mining sites and their impacts on health

The mining site of Kettara is an abandoned pyrrhotite mine situated 30 km northwest of Marrakesh. It contains more than 3 million tons of mining waste that continues to produce acid mine drainage (AMD) three decades after the mine's closure. Previous activities (1965–1982) have led to pollution of downstream wells by sulphates, magnesium, iron and heavy metals. In addition, through airborne yellow sulphurous dust and emissions, the waste deposits contribute to air pollution for the neighbouring farming and residential areas and to the potential impacts on health that ensue. * Mining operations ceased in 1982, but it was not until 2012 that studies were undertaken with a view to rehabilitation and plans were put forward to the authorities. In 2021, the site has still not been rehabilitated and, consequently, the residents' exposure to environmental problems persists.

The former iron-extraction site at Ait Ammar, where operations ceased in 1965, is polluted with Cd, Cr, Cu, Fe and Zn, as revealed in soil and plant samples. The estimated bioaccumulation of these pollutants and their transfer via the food chain signal the need to take regular measurements from the environment and the food chain to ensure that consumption poses no risk to health. **

In 2018, an estimated 25 million tons of material from coal-mining slag heaps at Jerada in the Oriental region covered 10–20 ha in the centre of the town. Before the closure of the mine, the populations were exposed to environmental pollution via the air, water and soil, and this has continued. The impact on miners' and residents' health has persisted even after operations ceased, particularly as the site has not been rehabilitated. The lead levels in populations living near the mines at Jerada vary between 250 µg/l and 980 µg/l. Several of the people affected are confirmed as former miners. *** Extremely high levels of lead poisoning were also recorded in 1993 and 1998 among school pupils under 12 years old in the same region.

An assessment of the quality of surface water and groundwater around the abandoned mining centre of Zaida has revealed significant contamination by metals such as Pb, Zn and Cu. More recently, the site has been strongly suspected of having contaminated the water with metallic elements at the Hassan II dam downstream. The levels of Pb and Cd measured meant that the water was not of a suitable quality for the supply of drinking water. An alternative water resource was proposed for the production of drinking water, such as the dam upstream from the mining site. ****

Source :

* www.researchgate.net/publication/233058885_Etude_geophysique_et_hydrogeologique_du_site_minier_abandonne_d_e_Kettara_region_de_Marrakech_Maroc_contribution_au_projet_de_rehabilitation.

** www.researchgate.net/publication/285548933_Human_and_animal_health_risk_assessment_of_metal_contamination_in_soil_and_plants_from_Ait_Ammar_abandoned_iron_mine_Morocco.

*** www.capm-sante.ma/uploads/documents/42.pdf.

**** www.jle.com/fr/revues/ers/e-docs/impact_du_site_minier_abandonne_de_zaida_sur_les_eaux_du_barrage_hassan_ii_maroc_314578/article.phtml?tab=texte.

³⁸⁹ www.pharmapresse.net/content/scandale-lamiante-dans-nos-%C3%A9coles-le-danger-invisible.

³⁹⁰ www.idrc.ca/en/research-in-action/mitigating-soil-contamination-abandoned-moroccan-mine-sites.

For some years, mining groups have sought to adopt sustainable methods of exploitation that incorporate population-centred aspects. Thus, new so-called “green” towns have been created, which provide mining communities with the infrastructure and facilities required for them to grow. This new approach seeks to offer relatively positive living and socioeconomic conditions for the well-being of the populations. However, some commentators highlight the absence of an approach that integrates these new towns into existing local towns and populations and refer to a divide and to social and territorial marginalization.³⁹¹ Moreover, no details are given as to whether a global environmental health approach, designed to maximize the positive impacts and minimize the negative impacts, is being adopted and whether participation by local populations is actually an integral part of this approach.

Occupational health and safety

In 2009, occupational risks were ranked 11th among the risk factors most responsible for death and disability in Morocco. They rose to 10th place in 2019, above the risks associated with the degradation of water quality, hygiene and sanitation, which was ranked 14th in the same year (down from 10th in 2009).³⁹²

In 2018, the number of occupational accidents in Morocco exceeded 50,000. No more than 5 per cent of the active urban workforce is covered by occupational medical insurance. Approximately 2,000 deaths a year are linked to the workplace, and occupational accidents involving more than three days off work amount to 47.8 per 100,000 employees. The cover afforded by occupational health services is unregulated in the public service and agriculture sectors and in the informal sector.

In 2017, 247,000 children aged between 7 and 17 years were working, including 162,000 doing hazardous jobs. Thus, 2.3 per cent of children aged between 7 and 17 years in Morocco were doing a job that exposed them to physical or psychological risks, such as using pesticides, carrying heavy loads or working long hours. Working was more prevalent among older children: 6 per cent of children aged between 15 and 17 years were working compared with 1 per cent of children aged between 7 and 14 years.

The majority of those children aged between 7 and 14 years were girls from rural backgrounds employed as domestic help.³⁹³ Regarding SDG indicator 8.7.1, the proportion of children aged between 5 and 17 years who were working in 2018 was 3.3 per cent. The target is zero per cent by 2030.

Silicosis is a lung disease that results from inhaling crystalline silica dust. It is particularly widespread among coal miners and those working in the metals industry. Morocco has no precise epidemiological data for cases of silicosis. In the city of Jerada, coal mining began in 1936 and ended in 2000. Of the 9,000 workers employed at the time the mine closed, 2,018 were reported as suffering from silicosis. Other unreported cases probably exist among people working in illegal mines.

Silicosis is a chronic disease that continues to develop after exposure to silica has ceased. The absence of a specific treatment to cure the condition means that early detection measures and, especially, prevention measures need to be put in place to avoid/minimize exposure. Patients are offered support in the form of therapeutic education programmes. In Morocco, silicosis is an officially notifiable occupational disease for which compensation is awarded on a scale of 22 occupational diseases that was introduced in April 2000; the level of compensation increases in cases where silicosis is combined with tuberculosis.³⁹⁴

A centre for the treatment of respiratory diseases and silicosis in Jerada received its first patients in 2017. This 55-bed facility targets the 3,000 patients suffering from silicosis in the province of Jerada and surrounding areas, as well as those from other cities and regions in the country. It has a day hospital with 15 consulting rooms, a strong medical team and modern, specialist equipment.

A study conducted in 2017–2019 to assess the health risks among tanners in small-scale leather-working facilities in the city of Fès³⁹⁵ revealed that clinical signs were significantly more common among the group of tanners (86 per cent, n=220) than among the control group (32 per cent, n=220). Osteoarticular disorders (77 per cent), dermatological diseases affecting the genitourinary system (36 per cent) and dermatological diseases (19 per cent) were more frequently encountered in tanners than in the control

³⁹¹ www.jssj.org/wp-content/uploads/2020/09/JSSJ-15-HARROUD-FR.pdf.

³⁹² www.healthdata.org/morocco/?language=48.

³⁹³ www.unicef.org/morocco/media/2046/file/Situation%20des%20enfants%20au%20Maroc%202019.pdf.

³⁹⁴ L. Senhaji and others, *Epidémiologie, facteurs de risque et physiopathologie de la silicose* [Epidemiology, Risk Factors and Pathophysiology of Silicosis], *Revue de Médecine Pratique*, no. 93 (October 2019).

³⁹⁵ www.capm-sante.ma/uploads/documents/85.pdf.

group (9 per cent, 8 per cent and 4.5 per cent, respectively). As regards blood parameters, no toxic concentration of chrome was discovered among the control or tanner group patients, although urinary infections were more common among the tanners (3.4 per cent compared with 0 per cent). It was clear that working conditions were unsatisfactory, which led to measures being taken to raise the awareness of tanners, introduce prevention techniques, secure personal protective equipment and conduct appropriate medical monitoring.

In the absence of a study of the prevalence of occupational exposure, the number of cancer cases by anatomical site was estimated nationally in 2004, and attributable fractions were subsequently drawn from the literature. According to these estimates, 608 cases of cancer a year in men and 25 in women are attributable to occupational exposure to certain agents. Asbestos is estimated to cause 146 cases of mesothelioma annually, and polycyclic aromatic hydrocarbons 148 cases of cancer of the larynx, lung and bladder. Furthermore, 109 cases of nasopharyngeal and lung cancer are said to be attributable to exposure to chromium VI compounds, while 114 cases of nasopharyngeal cancer are said to be attributable to exposure to wood dust.³⁹⁶

The SwissAid 2020 Report refers to a 2012 study by the Centre of Social and Historical Studies and Documentation on Phosphates relating to exposure by workers at the Safi and Jorf Lasfar industrial sites. Exposure to dust particles and other substances – SO₂, SO₃, H₂S and HF – is said to be responsible for respiratory disorders and cancer.³⁹⁷ According to this same report, the situation remained unchanged in 2019.

No record is yet kept in Morocco of the number of fatal and non-fatal accidents at work per 100,000 workers, by sex and by immigration status (SDG indicator 8.8.1) or of the level of compliance with labour rights (freedom of association and the right to collective bargaining) at national level by sex and migration status, in relation to International Labour Organization (ILO) texts and national legislation. Consolidated data on accidents at work and occupational diseases for recent years are not available. The supervisory authority for national insurance and social security estimated that, between 2011 and 2014, there were, on average, 43,155 workplace accidents each year.

In 2016, the Social Security Department calculated that there were 7,973 reported accidents at work, including 147 fatalities, and 99 cases of occupational disease.³⁹⁸

Road safety

During 2018, 94,944 road traffic accidents were recorded, involving 141,734 victims, 3,736 of whom died. In 2019, similar figures were recorded, with 89,375 accidents involving 133,737 victims and 3,726 fatalities.

The road traffic accident mortality rate was 1.1 per 10,000 population in 2015 and 0.937 per 10,000 population in 2018 (SDG indicator 3.6.1). Although the national target of 0.55 by 2030 has not yet been achieved, Morocco hopes to reduce the number of road traffic deaths by 25 per cent by 2021 and 50 per cent by 2026 following the introduction of a new road safety strategy.

Extreme events

The most significant extreme events in terms of potential human and economic impact are the risk of flooding, drought, earthquake and tsunami, which affect many areas of the country.

Floods can pose a major threat to human life and caused 47 deaths in December 2014 in the region of Guelmim. They can seriously damage the economies of major urban centres in the country, such as Tangier, Casablanca and Agadir, and can disrupt economic activities and infrastructure. Significant efforts have been made to mitigate the effects of flooding in the great plains. As part of these efforts, the DGE produced a study for the National Flood Protection Plan, which identified and recorded approximately 400 sites that were exposed to a flood risk. In addition to physical measures, action has been taken to improve flood prevention, particularly by improving the flood alert system and modernizing the measuring network.

Periods of drought regularly affect the country and result in a significant loss of farming GDP. They impact heavily on rural populations who sometimes have no option but to quit the countryside for neighbourhoods on the outskirts of major conurbations.

³⁹⁶ www.contrelecancer.ma/site_media/uploaded_files/PNPCC - Vol 1 - AXE EPIDEMIOLOGIE ETUDES DES FACTEURS DE RISQUES RNtgR5w.pdf.

³⁹⁷ https://voir-et-agir.ch/content/uploads/2018/12/Rapport_Maroc.pdf.

³⁹⁸ <https://incvt.ma/wp-content/uploads/2016/10/profil-SST-Version-finale-octobre-2017-derniere-version-1.pdf>.

Photo 13.4: Nations Beach, Rabat-Salé-Kenitra Region

Photo credit: ECE EPR Team

The earthquake risk applies to two specific parts of the country – the north, which is enjoying an economic development boom, and the region of Agadir, one of the biggest tourist centres in the country. The last earthquake of any significance in the north, in 2004, claimed more than 600 lives and destroyed 12,000 homes in the region of Al Hoceima.

In 2019, the number of people who died, were reported missing or were affected by natural disasters was 0.18 per 100,000 population, a total of 751 people directly affected by a natural disaster (SDG indicators 13.1.1 and 1.5.1).

13.3 Climate change

Impact of climate change

Morocco is considered to be extremely vulnerable to climate change. In particular, there is the risk of an upsurge in vector-borne diseases coupled with the risk that new vectors will be introduced, and that cardiovascular diseases linked to more heatwaves and a deterioration in air quality will increase. Furthermore, extreme weather events, such as

flooding and cold snaps, aside from having a physical, psychological and social impact, could lead to a rise in diarrhoeal illnesses and respiratory diseases, particularly among children.³⁹⁹

Changes in the climate could have a direct impact on the bioecology of arthropod vectors. This could provide a favourable environment for the outbreak, appearance or disappearance of certain species and thus could be the source of the emergence or re-emergence of vector-borne diseases such as Rift Valley fever, West Nile fever (caused by the West Nile Virus), chikungunya, malaria, Lyme disease and rickettsial infections. Meteorological parameters play a key role in assessing the risk associated with different disease vectors.

Children are particularly affected by climate change, given the conditions that are essential for their physical and psychological development. The consequences of climate change risk directly impinging on children's rights to access education, water and better health, especially in the face of vector-borne, cardiovascular and waterborne diseases.⁴⁰⁰

³⁹⁹ <https://apps.who.int/iris/rest/bitstreams/1064306/retrieve>.

⁴⁰⁰ www.unicef.org/morocco/media/2051/file/Rapport%20Sitan%202019%20synth%C3%A8se%20en%20fran%C3%A7ais.pdf.

13.4 Legal, political and institutional framework

Legal framework

Law No. 11-03 on the Protection and Conservation of the Environment is aimed at preventing and eliminating atmospheric emissions of pollutants capable of harming human health, fauna, soil, climate, cultural heritage and the environment in general.

The monitoring of air quality is governed by several legal texts, which include:

- Decree No. 2-09-286 of 8 December 2009, which establishes air quality standards and the procedures for air quality monitoring and provides for the creation of a national committee on air quality monitoring and surveillance and a standing regional committee on air quality monitoring and surveillance (CPRSQA) in each region that has a local air quality monitoring network;
- Joint Ministerial Order No. 3750-14, which establishes the information thresholds, alert thresholds and methods for applying the emergency measures relating to monitoring air quality; in addition, in the event that the alert threshold is exceeded, the order allows for the CPRSQA in the region concerned to recommend to the *wali* or governor that all emergency measures be taken to minimize the extent and the impact on the population of the spike in pollution. Furthermore, in the event that the information threshold is exceeded, the CPRSQA must take the necessary measures to inform the population of the nature of the polluting substance, its concentration, and the date and place the threshold was exceeded, for example. This order has not yet been effectively implemented, however.

Law No. 36-15 on Water dated 6 October 2016 is based on numerous principles, including:

- Equal access by all citizens to water and to a healthy environment to meet their fundamental needs in accordance with the provisions of article 31 of the Constitution;
- The right of all natural and legal persons under public and private law to use water resources from the public water services within the limits of the general public interest and in line with the obligations established by the present law and the texts adopted for its enforcement;
- Consideration of the water needs of populations in mountainous areas in line with a green development approach that is aimed at sustainability;

- Consideration of the water needs of populations downstream from dams to ensure that they continue to benefit from water from water courses;
- Integration of adaptations to climate change into all levels of water planning and management.

Unlike the 1995 Law on Water, this Law introduces a specific subsection on water for use in food production. It specifies that any activity or installation with the potential to pollute water is prohibited within the limits of an immediate protective boundary.

The Law specifies that the Government sets out the statutory conditions governing the treatment processes, the list of additives and other substances and the maximum permitted doses for the production of drinking water. It also establishes a list of materials that may come into contact with drinking water in the manufacture of bottles used for packaging and retailing water for food use. The Law also regulates the exploitation and sale of natural mineral water, spring water and table water. The text specifies that there are statutory conditions governing authorization of the sale of these types of water.

The Law introduces the development of the use of rainwater. Collecting, storing and using rainwater are therefore authorized. As regards the development and use of non-traditional sources of water, including reusing wastewater, the Law specifies that purified wastewater cannot be used for food purposes.

The Law states that, when pollution occurs that is shown to pose a threat to public health, safety or hygiene, the Government may coordinate with the ABH affected to take any immediate executive action to bring a stop to the pollution.

Water-related risk management has a section devoted to floods and one to drought. The methods for preventing, monitoring, issuing alerts and managing a crisis are dealt with in the Law.

Law No. 24-09 on the Safety of Goods and Services, adopted in 2011, is principally designed to:

- Prevent accidents linked to the use of goods;
- Ensure consumer confidence;
- Increase the responsibility of economic operators;
- Guarantee that goods comply with the regulations in force.

Chemical substances for industrial use are still governed by a law dating back to 1922 and the legislative, regulatory and institutional framework specific to the management of chemical substances and the assessment of their risks to health and

environment remains devoid. To this end, a bill on the registration of chemical substances has been drawn up. To limit the presence of certain chemical substances in industrial products, especially lead, the regulation applied to certain goods includes provisions that limit levels of this substance. IMANOR has produced standards that specify the requirements and specifications that automatically apply to ensure the suitability for use of materials and products. The Moroccan standards that set the acceptable limits for lead in household products are:

- NM 03.3.318, which sets the limit for lead in paints at 90 ppm;
- NM EN 71-3 (NM 21.8.003), which sets the maximum lead migration from materials for toys at 90 mg/kg;
- NM 21.8.010, which sets the maximum level for lead at 250 mg/kg in the coating of the barrel of a felt-tip pen or in the plastic it is made from, and at 100 mg/kg in inks;
- NM 09.0.000, which sets the limit value for lead in articles for babies at 0.2 ppm and in other articles at 1.0 ppm;
- NM 20.1.002, which sets the permissible limits for the emission of lead and cadmium for ceramic and vitro-ceramic crockery and glass tableware in contact with foodstuffs;
- NM 12.7.068, which covers soil quality, doses of cadmium, chrome, cobalt, copper, lead, manganese, nickel and zinc in soil samples using aqua regia/spectrometry;
- NM 20.1.004, which sets the permissible limits for lead and cadmium in ceramic cookware in contact with foodstuffs.

Pesticide products used in farming were subject to certification in line with the 2002 Law No. 42-95 (Dahir No. 1-01-350) and its enforcement texts. Certification is granted based on the opinion of an Agricultural Pesticides Commission, which is part of the ONSSA, established by Decree No. 2-01-1343. However, Law No. 42-95 was repealed and replaced by Law No. 34-18, which deals with plant protection products in accordance with the international nomenclature.

Pesticides used in public health and hygiene are still governed by the Dahir No. 1341 (2 December 1922) on poisonous substances, which dates back to 1922. Since 2006, an administrative process has been in place for marketing authorization. This process was strengthened in 2010 with the introduction by a Decision of the Minister of Health (No. 758 of 20 April 2010) of a technical committee for assessing pesticides. This measure was designed to improve assessment by the various Ministry of Health and

Social Welfare bodies concerned with applications for marketing authorization.

Law No. 28-07 on Food Safety of 11 February 2010, and its accompanying enforcing Decree No. 2-10-473 of 6 September 2011, introduces the general principles and prescriptions designed to ensure the safety of foodstuffs and the obligation to inform consumers via clear and comprehensive labelling. The principal provision of the Law covers approval of food preparation facilities and the imposition on them of control and traceability mechanisms for the products used and sold. Decree No. 2-12-389 of 22 April 2013 sets out the conditions and labelling methods for food products.

Law No. 17-88 of 10 September 1993 concerns the indications of shelf life to be included on canned and similar foods and on bottled water intended for human or animal consumption. Law No. 31-08 governs consumer protection measures. These laws are supplemented by the following joint orders issued by the Minister of Agriculture, Marine Fisheries, Rural Development and Waters and Forests (or his/her precedent title) and the Minister of Health and Social Welfare:

- No. 983-13 of 21 March 2013, which sets out the forms and methods for medical monitoring of staff in food-sector establishments and companies and a list of diseases and infections with the potential to contaminate food products;
- No. 1795-14 of 14 May 2014, which lists food additives and the limits authorized for their use in primary commodities and food products and which specifies what must appear on their packaging;
- No. 156-14 of 17 January 2014, which sets the maximum authorized limits for the residue of plant and crop protection products in and on primary commodities and food products;
- No. 1643-16 of 30 May 2016, which sets the maximum authorized limits for contaminants in primary commodities and food products;
- No. 293-19 of 15 February 2019, which lists and limits the microbiological criteria that are authorized in primary commodities and food products;
- No. 281-16 of 1 February 2016, which establishes the requirements and procedures for indicating nutritional information on the labelling of pre-packaged food products;
- No. 440-01 of 26 February 2001, which relates to the shelf life and storage conditions of certain products.

Regulatory texts govern the management and disposal of MPW. Law No. 28-00, enacted by Dahir No. 1-06-153 of 22 November 2006, concerns waste management and disposal. Decree No. 2-09-139 of 21 May 2009 specifically deals with the management of MPW. The following are also part of this legislative framework:

- Circular No. 040-236 DE/10 of 2 November 1994 relating to the collection of medical and pharmaceutical waste;
- Circular No. 16 DE/10 of 4 July 1994 relating to the creation of inspection committees for health-care establishments;
- Circular No. 230 DHSA/22 of 22 November 1996 relating to the cleanliness and hygiene of premises in health-care establishments and to their management and treatment of waste;
- Circular No. 59 DHSA/20/21 of 28 November 2000 relating to hospital hygiene programmes and the management and treatment of waste in health-care establishments;
- Circular No. 196 DMP/00 of 6 October 2010 relating to the end of marketing mercury thermometers and the ban on their sale.

A significant proportion of the Moroccan Labour Code is devoted to occupational hygiene, health and safety in order to safeguard the health and safety of workers and to comply with international conventions. As a result, Law No. 16-12 of 17 June 2013 effected the ratification by Morocco of ILO Convention C187 (2006), which provided the promotional framework for occupational health and safety. The Convention is intended as a progressive move towards a healthy, safe and clean working environment. Among other matters, the Code regulates the Council of Occupational Medicine and Occupational Risk Prevention as well as the health and safety committees. Several texts enforcing the Labour Code in the area of occupational health and safety have been adopted.

The risks associated with exposure to physical agents and/or chemical agents are the subject of specific texts dealing with safeguarding against exposure and establishing maximum exposure values for certain compounds.

According to the National Profile for Occupational Health and Safety produced in 2017, a regulatory framework exists that establishes obligations to protect workers from dangerous procedures, machinery and hazardous chemical, physical and

biological agents.⁴⁰¹ These obligations are not always enforced in practice, however.

Occupational health service coverage is not regulated in the public service, agriculture and informal sectors.

Policy framework

The 2011 Constitution recognizes health as a fundamental human right.

In 2010, the Ministry of Health and Social Welfare and the Department of Sustainable Development launched the National Programme for Health and the Environment. This was never implemented, although it does serve as a guideline for the deployment of environmental health measures by the actors concerned. The health authorities opted to highlight environmental factors such as drinking water, food, bathing water, ambient air, chemical products, hazardous waste and vector-borne diseases. In 2015, a consultation involving the different actors at the national, regional and provincial levels took place and focused on restructuring environmental health programmes. Several recommendations emerged from the consultation day.

The 2025 Health Plan, approved in 2018, is designed to introduce a person-centred approach to the national health system and is underpinned by six values: equity, solidarity, accessibility, quality, performance and accountability. The Plan comprises three pillars:

- Organizing and developing the range of health care offered to improve access to health services;
- Strengthening national health and disease-elimination programmes;
- Improving governance and optimizing resource allocation and use.

The pillars are divided into 25 intervention areas and 125 actions, each containing a series of executive measures. Several actions concern the fields of environmental health and occupational health. Area 16 of Pillar 2 seeks to promote healthy lifestyles and to strengthen health education. The actions envisaged are designed to:

- Launch and implement a national, multisector plan for healthy lifestyles;
- Strengthen and implement the National Nutrition Strategy;
- Strengthen communication on health education;
- Launch the digital “Public Health Channel” via the Internet;

⁴⁰¹ <https://incvt.ma/wp-content/uploads/2016/10/profil-SST-Version-finale-octobre-2017-derniere-version-1.pdf>.

- Develop e-health.

The objective of Area 19 of Pillar 3 is to improve working conditions and motivate health-care professionals. It should be noted that Area 17 of Pillar 3 is aimed at extending basic medical cover in a move towards universal health cover.⁴⁰²

The National Multisector Strategy for the Prevention and Control of Non-communicable Diseases 2019–2029 was officially launched in Rabat on 15 February 2019.⁴⁰³ This new Strategy is part of the 2025 Health Plan and is designed to reduce the morbidity, mortality and disability associated with NCDs and their risk factors by means of an integrated, multisector approach. It was drafted with the support of WHO using a participative approach that involved all relevant ministerial and institutional departments, NGOs, learned societies and the agrifood industry.⁴⁰⁴

Morocco has adopted the Global Strategy for Women's, Children's and Adolescents' Health (2016–2030).⁴⁰⁵

The Ministry of Health and Social Welfare requested the support of the WHO Regional Office for the Eastern Mediterranean in order to analyse the strengths and weaknesses of the public health system and to recommend ways of improving performance. This evaluation was carried out at the end of 2014, and the report was published in 2016.⁴⁰⁶ The key recommendations put forward concerned:

- Strengthening the role of the State by refocusing the central administration of the Ministry on more strategic functions, a move that involves restructuring the Ministry around a core public health role and placing the emphasis on standardization and strategic oversight;
- Creating a Public Health Institute to respond to the challenges of improving knowledge for the benefit of public health decision-making and to guide health prevention policy;
- Adopting a public health strategy.

Officially launched on 24 March 2010, the National Cancer Prevention and Control Plan (PNPPC) 2010–

2019⁴⁰⁷ provides 78 operational measures to undertake in strategic areas such as prevention, early detection, provision of treatment, palliative care and patient support. In response to the principal risk factors identified, the PNPPC put forward 10 preventative measures to take in the form of 30 specific activities. Of these 10, seven are linked to lifestyle habits and living conditions.

This first PNPPC led to improvements in the provision of treatment, creation of a structured oncology care sector and introduction of public health programmes, particularly early detection of breast and cervical cancer. The breast cancer early detection programme has been rolled out, while that for cervical cancer is in the process of being implemented. Early diagnosis and screening services are provided free of charge. Additional facilities and equipment, cancer specialists and greater access to medicines have been developed as part of strengthening provision. In addition, special units and mobile teams have been created and health-care professionals trained as part of developing palliative care.

Elsewhere, the 2019 review of cervical cancer in Morocco points to the low level of awareness and knowledge among the population of cervical cancer and screening, infection via the human papillomavirus (HPV) and vaccination against these types of virus.⁴⁰⁸ Participation by health-care professionals in cervical cancer screening and diagnosis is poor. The review also states that a primary prevention programme involving vaccination against types of HPV is planned, but that data on vaccine coverage are not available, and that the cost of the vaccine remains a major hindrance.

The PNPPC 2020–2029 is a continuation of the first Plan, placing particular emphasis on governance, quality of care, research and training as well as cancer prevention. One of the priorities of the PNPPC is to enhance monitoring and rollout of a patient-centred, computerized information system. Treating child cancers is one of the key areas of focus; paediatric cancer care and treatment have been specifically organized since the publication of the first PNPPC and are similarly included in the second.

⁴⁰² www.draatafilalet.ma/images/Publications-pdf/Plan-de-sant%C3%A9-2025.pdf.

⁴⁰³ www.sante.gov.ma/Documents/2019/02/Plan%20Strate%CC%81gique.pdf.

⁴⁰⁴ www.emro.who.int/fr/mor/morocco-news/lancement-de-la-strategie-nationale-multisectorielle-de-prevention-et-de-control-des-maladies-non-transmissibles.html.

⁴⁰⁵ www.who.int/life-course/partners/global-strategy/globalstrategyreport2016-2030-lowres.pdf.

⁴⁰⁶ www.sante.gov.ma/Documents/2016/02/3%20Rapport%20Evaluation%20FESP.pdf.

⁴⁰⁷ www.contrelecancer.ma/site_media/uploaded_files/PNPCC_2020_2029.pdf.

⁴⁰⁸ Essaada Belglaiiaa and Christiane Mougin, "Cervical cancer: current situation and management in Morocco", *Bulletin du Cancer*, vol. 106, no. 11 (November 2019).

The second PNPPC sets out fewer measures to limit exposure to environmental risk factors compared with the preceding Plan. On this aspect, it focuses on smoking cessation, on reducing exposure among workers and on their medical monitoring.

The Ministry of Health and Social Welfare, with the support of the Lalla Salma Foundation, has established the National Tobacco Control Programme to promote tobacco-free living.⁴⁰⁹ Several measures have been put in place, principally including:

- Organizing national information campaigns on the harms of smoking;
- Introducing a Tobacco-free Schools programme aimed at young people in educational settings, in collaboration with the Ministry of National Education, Preschool and Sports;
- Creating more than 400 smoking-cessation hubs within health centres and 60 hospital-based consultation centres;
- Training health-care professionals in how to support smoking cessation;
- Conducting several national epidemiological studies of smoking.

The National Multisector Strategy for the Prevention and Control of NCDs 2019–2029 is aimed at a relative reduction of 20 per cent in the current prevalence of smoking among people aged 15 years and over, in order to make public spaces smoke free. It proposes creating an advocacy strategy in favour of ratifying the WHO Framework Convention on Tobacco Control and revising Law No. 15-91 on banning smoking and tobacco advertising and promotional messages.

The Ministry of Health and Social Welfare has made controlling TB a priority. In practice, this has meant a significant increase in the annual budget allocated to the National TB Control Programme, which rose from 30 million dirhams in 2012 to 60 million dirhams in 2016. This was in addition to the financial support from the Global Fund to Fight AIDS, Tuberculosis and Malaria of almost 85 million dirhams for the period 2012–2017. This funding made it possible to refurbish the Centres for the Diagnosis of Tuberculosis and Respiratory Diseases and to equip them with digital radiography machines and high-tech molecular biology equipment, while ensuring that all health provision remained free to TB patients.

A guide to methods for treating tuberculosis in children, adolescents and adults was published in 2020

by the Ministry of Health and Social Welfare with support from UNICEF.⁴¹⁰

The INDH adopts a multisector approach to creating activities in the field of human development. The INDH is intended to reduce major socioeconomic disparities and promote economic inclusion of the most disadvantaged people, thereby safeguarding their dignity (box 13.3).⁴¹¹ Phase III (2019–2023) is organized into four programmes: (1) Closing gaps in basic social services and infrastructure (2) Supporting individuals living in a state of insecurity; (3) Improving the income and economic inclusion of young people; and (4) Boosting the human capital of future generations.

The draft National Vector Control Plan 2019–2025 was developed in response to a planning need dictated by the emergence and re-emergence of vector-borne diseases worldwide and is one of the first concrete implementations of the actions and measures foreseen by the 2025 Health Plan. The objective of the Vector Control Plan is to reduce the burden of disease and the threat of vector-borne diseases through effective and sustainable vector control adapted to the context of each administrative region of the country. The Plan is based on four pillars, which aim to:

- Strengthen intra- and intersectoral action and collaboration;
- Involve and mobilize communities;
- Strengthen vector surveillance and the monitoring and evaluation of interventions;
- Strengthen skills and the integration of tools and approaches.

The objective of the PNAir is to consolidate the initiatives that have already been launched to prevent and reduce atmospheric emissions from fixed and mobile sources. It is also intended to strengthen the legal framework and to inform and raise awareness. It is being implemented as part of a partnership initiative that involves all key actors.

The PNAEPI, costing 115 billion dirhams, is aimed at accelerating investment in the water sector to increase drinking-water supply and irrigation and bolster the resilience of Morocco in the face of climate hazards and disruptions. It is based on five areas:

- Developing water supply;
- Managing water demand and efficiency;
- Increasing supply of drinking water in rural areas;

⁴⁰⁹ www.sante.gov.ma/Pages/Communiqués.aspx?IDCom=286.

⁴¹⁰ www.sante.gov.ma/Documents/Prise-en-charge-de-la-TB.pdf.

⁴¹¹ www.indh.ma.

- Reusing treated wastewater;
- Informing and raising awareness.

Its implementation is particularly important from a health perspective, as it provides lasting access to good quality drinking water and to water for hygiene purposes, particularly in rural areas. Efforts already made in this area are worth pursuing, especially given the results obtained in reducing waterborne diseases in recent years.

In 2008, 14,911 rural schools had no drinking water supply and 17,785 had no sanitation. This detrimental situation was leading to absenteeism among girls, the spread of waterborne diseases and poor living conditions. As a result, the National Programme of

Environmental Upgrading of Rural Schools and Mosques (PMNEER) was launched in 2009 by the then Ministry of Equipment, Transport, Logistics and Water, including a component to upgrade mosques (box 13.4). The 2012 review showed 883 rural schools and 407 mosques and koranic schools were upgraded for an initial target of 15,000 rural schools and almost 8,285 mosques and koranic schools.

No details are given as to how the programme is steered and monitored. Other than some specific reports on action taken by international partners, no report is available that provides a national review of the Programme, which has been running for more than 10 years.

Box 13.3: Measures taken as part of the INDH

Access to health care has been expanded in the form of 519 health centres, 1,150 ambulances, and 560 medical caravans, as well as health campaigns. Measures have been taken to promote the schooling and social integration of young people (512 youth centres), to support individuals living in insecurity (centres for women and for older people) and to boost economic inclusion, with women accounting for 50 per cent of the beneficiaries.

A regeneration programme of informal settlements has been under way since 2005. This initiative is being developed in the Wilaya of Casablanca in particular. Of the 5 million inhabitants in the region of Greater Casablanca, an estimated 20 per cent were living in unsanitary housing at the start of the programme, equivalent to around 900,000 people.⁴¹² The programme is working to connect housing for 500,000 residents in informal settlements to drinking water, sanitation and electricity services by involving all the stakeholders and making the population aware of the uses of water. These projects are implemented with the specific support of the populations and are accompanied by the introduction of a transparent social tariff and regularization of access to services. The programme is having an impact on the environmental and social determinants of health by improving the living conditions of the inhabitants and their social inclusion in neighbourhoods. Access to basic services in disadvantaged neighbourhoods helps to improve the living and built environment and progressively integrates these settlements into the city. It also acts as a driver for the economic and social dynamism of these neighbourhoods.

Again, as part of the INDH, several measures are being undertaken with populations living in insecure conditions to lessen the impact of the COVID-19 pandemic. Essentially these measures involve covering the cost of operating, equipping and upgrading walk-in centres for people living in insecurity. The measures also encompass residential facilities for women who are pregnant and those who have just given birth. In addition, the measures also provide pregnant women and babies living in rural and peri-urban areas with good quality nutrition.

Box 13.4: Projects in the National Programme of Environmental Upgrading of Rural Schools and Mosques

The projects implemented as part of the PMNEER notably provide for the construction of toilet blocks, the installation of drinking-water infrastructure and the creation of facilities to store and recycle waste and rubbish. Children in rural schools receive educational and awareness-raising sessions on questions of hygiene and the environment. Provision may also involve setting up environmental clubs and engaging parents and pupils in environmental issues, as well as maintaining the infrastructure and facilities created. The projects seek to involve local actors to ensure the installations and the environmental initiatives are sustained and maintained. The programme was extended beyond 2012, notably with international aid. Included was the 2010–2017 project to support the PMNEER, conducted as part of Belgian Development Cooperation and Humanitarian Aid, in the Souss-Massa, Drâa-Tafilalt and Oriental regions. In 2016, this project culminated in the installation of toilet blocks in 114 rural primary schools, benefiting 12,379 pupils.*

* <https://openaid.be>.

⁴¹² <https://client.lydec.ma/site/inmae>.

The Department of Sustainable Development, in partnership with the Ministry of the Interior, the Ministry of Economy and Finance and the DGE, drew up a programme to pool the activities of the PNA in rural and urban areas and the Programme for Wastewater Treatment and Reuse. Approved in 2018 and launched in 2019, the object of the combined programme is to improve the connection rate to the sewerage system and the decontamination rate. It provides for the creation of 154 sanitation projects as part of the ongoing PNAM, which is designed to achieve 90 per cent mains connection and 80 per cent decontamination by 2040. Thus, 1,207 sanitation projects in key municipalities are already planned, which should deliver close to these targets (i.e., a connection rate of 50 per cent by 2030 and 80 per cent by 2040 and a decontamination rate of 40 per cent by 2030 and 60 per cent by 2040) and further projects are to follow. Particular attention is being paid to reusing treated wastewater, with goals of 474 million m³ of purified wastewater annually by 2030 and 573 million m³ by 2040.⁴¹³

The National Flood Protection Plan, introduced in 2002, was updated in 2017 with the aim of producing a comprehensive list of sites at risk of flooding and to put forward action plans to ensure better protection against such risks. The National Action Plan 2020–2030 for managing natural risks and disasters is coordinated by the Ministry of the Interior. The Plan is designed to reduce vulnerability to natural disasters and make the country better able to withstand the damaging consequences of this type of event.

The PCN is aimed at establishing the basis for low-carbon development that is resilient in the face of climate change.⁴¹⁴ As part of the rollout of its climate policy across the country, the Ministry of Energy Transition and Sustainable Development is supporting the development of regional climate plans (PCRs). In 2020, preparatory studies for the drafting of the seven PCRs were begun for the regions of Beni Mellal-Khenifra, Tangier-Tétouan-Al Hoceima, Casablanca-Settat, Drâa-Tafilalet, the Oriental region, Guelmim-Oued Noun and Laâyoune-Sakia El Hamra.⁴¹⁵

In 2010, Morocco launched its Health Sector Strategy for Adaptation to Climate Change, focused on:

- Protecting the health of the population from the impact of climate change and reducing health risk inequalities;

- Improving the epidemiological monitoring system;
- Increasing the resilience of health facilities in the face of extreme events;
- Preparing emergency and response plans;
- Building the capacities of health professionals in the area of climate change;
- Promoting research into the impacts of climate change on health;
- Effectively informing and raising the awareness of different sections of the population, such as decision-makers and vulnerable individuals.

As part of implementing this strategy, Operational Action Plans for 2017–2021 were produced to adapt the health sector to climate change.

In 2013, the Ministry of Health and Social Welfare introduced the National Envenomation Control Strategy. Its key areas are strengthening the information system and acquiring an anti-venom serum for the majority of venomous species in Morocco.

Programmes to eradicate vector-borne diseases occupy an important place in public health protection activities, particularly those directed at rural populations, who are most exposed to the risks of parasitological diseases.

The Plan for Monitoring Chemical Contaminants in Fisheries Products is a mechanism introduced in 2006 and comprises a programme of surveillance. It provides for the monitoring of potential chemical contamination of the principal fish species landed at Moroccan ports and includes the appropriate management measures to be taken to protect consumer health. Sampling of fish products is scheduled annually for the whole Moroccan coastline to determine mercury levels in these products. The sampling is done by the veterinary services of ONSSA at various fishing ports in the country. The samples taken involve the 36 different species of fish landed on Moroccan coasts that are most regularly consumed in the country.

The programme for the safe management of PCBs in Morocco is designed to strengthen the regulatory framework and national capacity for the safe management and disposal of PCBs and to establish local infrastructure for dismantling equipment and decontaminating oils and materials for reuse.

⁴¹³ www.environnement.gov.ma/images/a_la_une/Publications%20PDF/Sable-FR-EXE-2020.pdf.

⁴¹⁴ www.umi.ac.ma/wp-content/uploads/2020/11/ODD-13-A8-Plan-climat-national-horizon-2030.pdf.

⁴¹⁵ www.environnement.gov.ma/fr/climat.

The National Integrated Strategy to Eliminate Carbon Monoxide Poisoning, developed by CAPM in 2009,⁴¹⁶ is based on six strands:

- Assessing the extent of CO poisoning as realistically as possible;
- Standardizing and prioritizing care and treatment;
- Developing an Information, Communication and Education (ICE) programme for the population and health professionals;
- Providing health professionals with the means required for diagnosis and treatment;
- Encouraging the introduction of regulations to reduce the sources of poisoning;
- Facilitating multisector collaboration.

For the strategy to succeed, CAPM has been calling for several years for the challenges, which are essentially about finance, regulation, inspection, coordination and innovation, to be met. Preventative measures are ongoing, but the regulatory framework that could help reduce the number of CO poisonings is not in place. Implementing the Strategy requires the involvement of the departments responsible for health, education, industry and trade, as well as consumer organizations, retailers of heating boilers, architects and entrepreneurs.

The National Profile for Occupational Health and Safety was approved in 2017. It was drafted in line with the recommendations of the ILO. The profile provides an overview of the occupational health and safety situation in Morocco. It gives the relevant information and data regarding the legislation, mechanisms for scrutinizing national policy on occupational health and safety, infrastructure, collaborative bodies, the activities of the different parties concerned, human resources, the actors concerned, statistics and indicators, demographics, problems and challenges, as well as the progress achieved towards a safe and healthy workplace. The profile serves as a basis for drafting and re-examining the national occupational health and safety programme and represents the first stage in the process of producing and instigating a national strategy.⁴¹⁷

As at July 2021, 65 ILO conventions had been ratified by Morocco. Seven (of an existing eight) are Fundamental Conventions, four (of four) are Governance or Priority Conventions and 54 (of 178) are Technical Conventions. Of the 65 conventions

ratified by Morocco, 49 remain in force, 11 have been terminated, 5 instruments have been revoked and none has been ratified over the past 12 months.

The Promotional Framework for Occupational Health and Safety Convention, 2006 (No. 187) was ratified by Morocco in 2013, but no notification of this fact was submitted to the ILO. In applying the terms of the Convention,⁴¹⁸ the country is required to develop a national occupational health and safety policy, system and programme in consultation with both sides of industry. It is also required periodically to consider the measures to adopt in order to ratify the relevant ILO occupational health and safety conventions and thereby promote a culture of accident prevention that will safeguard the health and safety of workers. In 2020, Morocco drew up a national policy and strategy for health and safety at work. A programme for executing the strategy for the period 2020–2024 is being finalized with some measures being taken in 2020.

Those ILO conventions that have not been ratified include protection from radiation (C115), health and safety in agriculture (C184) and construction (C167), occupational health services (C161), workers' health and safety (C155), occupational cancer (C139) and the working environment (C148).⁴¹⁹

The Initiative for the Fight against Child Labour by the Private Sector in Morocco (ILTESAM) is a pioneering scheme led by the CGEM. It is designed to help eradicate child labour in the country and to support member businesses in taking action to tackle child labour by providing them with the necessary information, online training and awareness-raising kits. It also aims to facilitate exchanges among businesses to enable them to share good practice in this area.⁴²⁰

Institutional framework

Ministry of Health and Social Welfare

The Ministry of Health and Social Welfare prepares and implements health-related government policy. The Ministry of Health directorates include the Directorate of Hospitals and Outpatient Care, Directorate of Population, Directorate of Medicines and Pharmacy and DELM. DELM is responsible for:

⁴¹⁶ www.capm-sante.ma/uploads/documents/6.pdf.

⁴¹⁷ <https://incvt.ma/wp-content/uploads/2016/10/profil-SST-Version-finale-octobre-2017-derniere-version-1.pdf>.

⁴¹⁸ www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C187.

⁴¹⁹ www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102993.

⁴²⁰ www.ilo.org/ipecc/Events/WCMS_781492/lang--en/index.htm.

- Epidemiological surveillance of the population and maintaining a central epidemiological register;
- Evaluating the epidemiological characteristics of the population; conducting all epidemiology surveys and studies;
- Designing and producing disease control programmes;
- Scheduling and taking action to protect the ambient environment and, by intervening in prevention and control, supporting programmes to eliminate diseases;
- Conducting quality control in biology laboratories under the Ministry and establishing their operational technical standards;
- Promoting and participating in checking that regulations are being applied in radiation protection, contributing to the surveillance, monitoring and control of installations using ionizing radiation and participating in the surveillance of environmental radioactivity;
- Carrying out health checks on foodstuffs.

The DELM comprises the:

- Epidemiological Surveillance Service;
- Environmental Health Division;
- Non-communicable Diseases Division, which covers the mental health and degenerative diseases service, oral medicine service, occupational health service, metabolic and endocrine disorders service, and cardiovascular and neoplastic diseases service;
- Communicable Diseases Division, which covers the parasitical diseases service, respiratory diseases service, ocular and otologic disorders service, dermatological diseases service, sexually transmitted infections and AIDS service, and epidemic diseases service;
- National Institute for Hygiene and CAPM;
- National Radiation Protection Centre.

The Epidemiological Surveillance Service works across all sections of the DELM. Its mission is to conduct national epidemiological observation and surveillance. It draws on the Regional Public Health Services (RPHSs), which replaced the Regional Health Observatories in 2018, and the Provincial Epidemiology Units (CPEs). These bodies are an extension of the service at the regional and the provincial and prefecture levels, respectively. Their remit is to coordinate epidemiology activities, conduct epidemiological surveillance at their level, ensure that data are automatically put to use and feedback is provided, make sure that the results of surveillance are exploited for local decision-making and action and create reliable, decentralized databases. The 12

RPHSs and 83 CPEs operate with staff who are virtually all trained in epidemiological intervention. Nonetheless, according to the centres, disparities exist as regards resources and the means at their disposal. Epidemiology training of RPHS and CPE doctors was organized when the service was created. A training programme in the field of epidemiology was launched in 2010 by the National School of Public Health (ENSP) as part of the Field Epidemiology Training Programme, in coordination with the United States Centres for Disease Control and Prevention (CDC), which aims to train executives specializing in field epidemiology. However, this training is not exclusively dedicated to managers of RPHSs and CPEs. This effort needs to be repeated as part of continuing professional development and training for new members of staff and to strengthen the workforce.

The Environmental Health Division is tasked with formulating Ministry policies and strategic guidelines for assessing and controlling environmental health risk factors (water and air quality), including those linked to food safety and hygiene and disease vectors. Its role is to:

- Develop tools, methods and procedures for assessing environmental risks;
- Supervise the instruction and management of authorization requests relating to the use of: packaged water (mineral water, spring water and table water); the products, materials and processes used in the production and distribution of water for food; and health and public hygiene pesticides; and the collection and transport of category 1 and 2 MPW;
- Initiate and draft regulatory texts, circulars and standards relating to environmental health;
- Manage various committees: technical committees for the evaluation of pesticides; scientific committee for the evaluation of food-related health risks; the standardization committee for water for food use; and the national committee for integrated management of vector control;
- Develop and implement the action plans of the Environmental Health Division: action plan for the development of IVM in Morocco, and action plan for the safe management of health and public hygiene pesticides.

To fulfil this remit, the Division is divided into five sections: the Basic Sanitation Service, Food Hygiene Service, Vector Abatement Service, Intersectoral Action Service and Environmental Health Service.

The Ministry of Health and Social Welfare is represented in each of the regions by a Regional Health Directorate. The Ministry has a network of 36

regional and provincial public health laboratories, which intervene in particular in the field of environmental health.

A provincial delegation exists in each province or prefecture. At the local level, between 500 and 600 technical experts attached to the Ministry undertake operational missions in association with the unit engineers and senior administrators responsible. Environmental health missions at the regional and provincial or prefectural levels are presented with a descriptive sheet accompanying the letter from the Secretary-General of the Ministry, dated 1 April 2019, on the implementation of environmental health missions at the regional and provincial level. This framework document also specifies the regional and provincial environmental health action plans that must be developed and implemented every year, with the production of annual reviews.

The mission of CAPM is to ensure the national health vigilance and alert function so that it is capable of anticipating the risks related to poisoning, adverse events and incidents related to health products, products consumption and environmental contaminants. It has two systems for collecting declarations: toxicovigilance, which receives the reporting forms for poisoning cases from the various medical delegations in the country, and toxicological information, which receives telephone calls from both the public and health professionals. CAPM regularly reminds the population and professionals of the safety and prevention rules to avoid poisoning.

In September 2019, Morocco instituted a National Public Health Emergency Operations Centre (CNOUSP), set up as part of the 2025 Health Plan. At the same time, Regional Public Health Emergency Operational Centres (CROUSPs) and Rapid Intervention Multidisciplinary Teams (EIRs) were created in each region, province and prefecture. The CNOUSP is part of a new mechanism designed to enhance the capacity of Morocco to detect public health emergencies earlier, prepare for them and respond rapidly and appropriately. Its missions relate to health observation and early warning and preparing for potential epidemics and other health emergencies, whatever their origin, including carrying out simulation exercises.

In the area of water for human consumption, the Ministry is involved in health aspects, certifications and protecting the resource.

Officials from the Ministry are responsible for checking the compliance of established public utility services, while the utility service supplier is

responsible for preparatory studies to identify the delineated protected areas for drinking water resources. As regards the physical and chemical quality of the water, the Ministry of Health and Social Welfare issues waivers in response to recurrent concentrations of nitrates and pesticides in particular, where these levels do not comply with statutory values. The waivers are granted for parameters and concentrations that present no risk to consumer health. They are limited to three years to give suppliers time to introduce appropriate treatment; as at October 2021, two exemptions have been issued. Data on waivers granted are not available to the public. Generally, suppliers opt to introduce a treatment process or to change the borehole. Few, if any, cases lead to action being taken on the causes of excessive nitrate or pesticide levels. Furthermore, little information is available on the impact of nitrates on the Moroccan environment. This impact has not been assessed and no diagnosis is available.

As part of a health risk assessment of drinking water, following Recommendation 10.9 of the first EPR and in line with WHO guidelines, Morocco adopted standard NM 00.5.057 in 2020, establishing drinking water safety plans. As the standard has been recently introduced, the plans for managing water safety have not yet been executed.

The Ministry is responsible for the safety of water destined for human consumption. This responsibility is exercised at the local level by officers of the Ministry commissioned under the Water Police. The production and supply of drinking water from the plant to the consumer's tap is checked and controlled using this system. Water samples are taken by Water Police officers and analysed by laboratories that are part of a national network. There are statutory provisions governing an annual schedule for the frequency and location of the sampling and the types of analysis carried out. Data relating to water health checks are managed by technical staff from the Water Police at the local level and are recorded in a database. In cases of non-compliance with statutory provisions, the Water Police officers manage the situation and ensure that the required water quality is re-established. In rural areas, public water supply is often managed by a municipality or village association and overseen by the Ministry of the Interior. As a result, in the event of an anomaly or system failure, the Ministry contacts the Ministry of the Interior to have corrective action taken. Any consequences of formal notices and injunctions are not followed up by the Ministry of Health and Social Welfare. Officers appointed by the Ministry of Health and Social Welfare are qualified to collect samples as part of controlling and inspecting drinking-water installations.

The results of drinking-water safety checks are the subject of a national report on water quality published every two years by the Ministry. At the same time, water suppliers are legally obliged to produce an annual report relating to their monitoring. These documents are not publicly available.

The National Office of Electricity and Drinking Supply (ONEE) is responsible for surveillance of delineated protected areas, raw water, and water production and supply. The service supplier is subject to less surveillance where the public water supply is managed by small local authorities in rural areas. Provision is made for the drinking-water resource to be sampled by the relevant ABH, due particularly to the specialist technical nature of this type of sampling. ABHs monitor the quality of both surface water and groundwater in the natural environment.

In 2019, the services of the Ministry conducted 13,788 analyses, including 10,538 on the supply network. The rate of bacteriological compliance was 92.5 per cent, the main bacteria identified being *Escherichia coli* and faecal enterococci. In 2016 and 2017, the reported rates of bacteriological non-conformities were 25 per cent and 26 per cent respectively. The rate of non-conformities was higher for untreated water (59 per cent, 2016; 64 per cent, 2017) than for treated water (11 per cent; 12 per cent).

Morocco does not possess any data on the level of parasites in water used as a source of drinking water. In total, 3,250 analyses were carried out on collective water supplies, which include public water points, wells and boreholes, showing 58 per cent compliance. This microbiological quality assessment is done using control tests to check disinfection (chlorine concentration) in the supply networks (26,810 tests; compliance rate 95.6 per cent) and at collective water supply points (16,011 tests; compliance rate 58.1 per cent). The poor compliance rates are considered the result of problems with managing these water points. The local departments of the Ministry are able to provide management support.

As part of its remit, the Ministry carries out health inspections of drinking water installations. In 2019, 4,038 inspections or controls were performed on the urban water supply networks and 13,014 on water points in rural areas. Following these inspections/controls, the inspection services issued 1,414 recommendations to tackle the irregularities uncovered. The inspections are regulated by the Guide to Health Inspections of Drinking Water Supply

Systems produced by the Basic Sanitation Service.⁴²¹ The Guide sets out the approaches and procedures that must be adopted by health professionals responsible for inspecting drinking-water supply installations, including the forms used for each section of the drinking-water supply system from resource to consumer's tap and a template for inspection reports.

The Ministry is competent to certify and inspect bottled water. It manages certification of the resource and the bottling of spring and mineral water. Before certification is issued, the quality of the water is monitored for a year to determine the stability of its composition. The bottling facility is subject to certification, and health inspections apply from the resource throughout the production chain to the finished product. The Ministry schedules checks at retail outlets. Installation inspections are conducted within bottling facilities. For water to be certified and to bear the accompanying Natural Mineral Water (EMN) label, it must present certain characteristics and its therapeutic properties must be scientifically proven. Applications for EMN certification are addressed to the Spa Committee, which rules on applications and answers to the Ministry of Health and Social Welfare. In the context of decentralization, the Ministry Circular of March 2021 relating to the sanitary control of natural mineral water, spring water and table water specifies the intervention framework of the regional offices in this area.

Local delegations of the Ministry deal with health coverage of beaches. These departments take action to improve the health and hygiene conditions of beaches. They manage medical first aid posts on beaches in collaboration with civil defence and the Moroccan Red Crescent. Mass catering establishments are inspected and controlled in collaboration with Municipal Hygiene Offices and ONSSA, and checks are carried out on bottled water distributed at water points on beaches. In addition, awareness-raising and health education activities – such as beach-cleaning campaigns – are instigated. In 2018, 84 first aid posts and 451 health professionals were deployed and conducted 12,762 consultations. Treatment was dispensed on 11,275 occasions and 675 patients were referred to hospital. Inspection activities comprised analysis of 1,058 drinking water samples and checks on 914 health facilities and equipment. Also, 4,561 educational and awareness-raising sessions were carried out for the benefit of 32,458 participants.

The Ministry supervises the management of MPW. It carries out quality audits of health establishments,

⁴²¹ www.pseau.org/outils/ouvrages/ministere_de_la_sante_ma_guide_de_l_inspection_sanitaire_des_systemes_d_alimentation_en_eau_de_boisson_2007.pdf.

focusing particularly on hygiene and including MPW management. In addition, Circular No. 16/DELM/10 of 1994 created health-care establishment inspection committees. The Ministry has produced various tools as part of raising awareness of MPW management and related training for health-care facility staff. These include:

- A baseline audit of health-care establishments for proper MPW management;
- A questionnaire to audit MPW management in health-care establishments;
- A guide to waste management for health-care establishments;
- A guide to managing sharps waste in the health-care setting;
- Posters to raise awareness in health-care establishments of good MPW management practice.

The Ministry helps develop the national occupational health and safety strategy in collaboration with the departments and institutions concerned. The aim is to promote measures designed to stimulate and coordinate occupational medicine, develop health and safety in the workplace and introduce occupational health facilities.

In 2017, there were 40 occupational health units, 26 of them with a doctor specializing in occupational medicine.⁴²²

Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests

The Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests is in charge of food safety policy. It drafts and publishes legal and regulatory texts on animal health and welfare and the safety of derived food products for the whole of the country and at border posts.

ONSSA, created following enactment of Law No. 25-08 of 18 February 2009, is a public body overseen by the Ministry. It is tasked with implementing government policy on the safety and welfare of animals and derived food products. It is responsible for protecting the health and welfare of animal stocks and controls products of animal origin for import into the domestic market and for export. ONSSA is supported by 10 regional directorates, each with a veterinary division to which are attached regional analysis and research laboratories. Three directorates for quality control, based in Agadir, Casablanca and Tangier, are in charge of import and export checks on

all food products and are answerable to the respective regional directorates. The veterinary services at the provincial and prefecture level complete the ancillary structure of ONSSA. ONSSA has qualified veterinary inspectors and technicians for the purposes of carrying out inspection and control tasks.

The system of controlling food safety is based on health authorization or certification of food outlets, on the one hand, and, on the other, controlling the compliance of primary products, food products and animal feed, which are produced for the domestic market or imported or exported. Every establishment or company that has received health authorization or certification is subject to regular health inspections to check that the required conditions that led to the issuing of the authorization or certification are still being met.

Inspection and control, from the point of exploitation to the consumer, takes place at different levels: production conditions, diseases, inputs (seeds, pesticides and veterinary medicines) and food additives, health authorization and certification, processes, conditions for transformation and processing, storage and transport, marketing conditions, compliance and labelling, and mass catering.

Depending on the case, checks on food outlets are a matter for:

- ONSSA, for facilities and companies that handle primary products, food products and animal feed;
- The marine fisheries delegations, together with ONSSA, for facilities and companies that handle maritime fishery and marine aquaculture products, including products derived from maritime fishing, such as fish oils and fishmeal;
- The competent authorities for municipal or district hygiene and cleanliness, together with the Ministry of Health and Social Welfare departments and the ONSSA departments for retail and mass catering outlets and companies, are the Municipal Hygiene Offices (BCHs). They thus have a role in preventing foodborne illnesses and diseases caused by solid and liquid food products by ensuring they are healthy and safe, and in protecting the consumer from these. These offices therefore undertake awareness-raising and training, inspection and control, sampling, seizure and disposal, as well as related administrative activities, such as enforcing closures and issuing formal notices.

⁴²² <https://incvt.ma/wp-content/uploads/2016/10/profil-SST-Version-finale-octobre-2017-derniere-version-1.pdf>.

Ministry of Energy Transition and Sustainable Development

The Department of Sustainable Development within the Ministry of Energy Transition and Sustainable Development is responsible for implementing government policy in the area of protecting and enhancing the environment (chapter 1). Its Directorate of Programmes and Implementation comprises a Health and Environment Service incorporated into the Pollution Prevention and Control Division (figure 1.3).

Since 2017, the National Programme for Monitoring Bathing Water Quality on the Atlantic and Mediterranean coasts has been run by the Department of Sustainable Development via the LNEP (box 13.5). The Programme is implemented by the Public Laboratory for Tests and Studies (LPEE) through its Centre for Environmental and Pollution Studies and Research (CSREP).

Ministry of Land Management, Urban Planning, Housing and Urban Policy

The Ministry of Land Management, Urban Planning, Housing and Urban Policy is involved in designing and guiding policy associated with the environment in which populations live. According to the Constitution of Morocco, access to decent housing is a right that guarantees the dignity of Moroccan citizens and

contributes to social cohesion. One of the strategic objectives of the Ministry is to close interregional development gaps and to strengthen social cohesion. The objectives also include reducing the lack of housing and broadening its range.

In December 2020, the then Ministry of Energy, Mines and Sustainable Development and the then Ministry of National Planning, Urban Planning, Housing and City Policy signed a partnership agreement to consolidate collaboration between the two ministries aimed at encouraging sustainable development in the areas of national land-use planning, urban planning, housing and city policy.

Ministry of the Interior

In 2006, the Communal Charter placed the President of the Communal Council in charge of managing the hygiene and cleanliness of the environment of citizens, with one of the departments responsible being the Municipal Hygiene Office (BCH). The 271 BCHs in Morocco are affiliated to the Ministry of the Interior and cover all the communes and municipalities in the country. Each BCH has a doctor responsible for its administrative and technical management. The BCH is a municipal technical service responsible for monitoring the cleanliness and hygiene of the environment in which the population lives.

Box 13.5: National Programme for Monitoring Bathing Water Quality

Following pilot operations undertaken by the Department of Ports and Maritime Public Domain, designed to determine the quality of the sand on beaches in 2010 and 2016, the Department of Sustainable Development has been monitoring the quality of the sand on beaches since 2017. The sand at 45 beaches in 2018 and 53 beaches in 2019 was analysed. Sixty samples were scheduled to be analysed in 2020. The physical and chemical parameters (heavy metals and hydrocarbons) and mycological parameters were analysed, and marine waste on beaches was characterized. The 2019 results showed the presence of trace metallic elements, none of which exceeded the reference thresholds, and the presence of dermatophytes and fungi on some beaches. Almost 84 per cent of waste on beaches was plastic/polystyrene in nature. This tendency is confirmed by two other projects conducted in parallel – “Adopt a Beach” in 2018 and “Fishing Waste”. In respect of the first, plastic/polystyrene represented 74 per cent of waste collected at four Mediterranean beaches and during the second, 95 per cent of waste collected from the fishing port of Fnidep was plastic/polystyrene and fabric/textile in nature.

Bathing water quality results are made available to the public through on-site notices and bimonthly posts on the LNEP website. The website includes health recommendations for bathing that cover recommendations relating to COVID-19: “Observe hygiene and prevention rules to avoid the spread of COVID-19, particularly physical distancing, protective measures, cleaning and sanitizing and the ban on mass gatherings”. * LNEP has a Geographic Information System (GIS) that indicates the location of stations and beaches as well as historical data on bathing water quality.

A review of each bathing season is presented as part of a publicly available annual report. The report is also a tool for local actors to help improve and/or maintain the quality of beaches. Recommendations on how to improve bathing water quality are set out at the end of the report. For several years, these recommendations have stressed the impact of wastewater and the need to control it.

* <http://labo.environnement.gov.ma>.

In particular, it monitors and controls the hygiene of public buildings, housing and urban planning and development projects, the cleanliness of public and health transport, roadways and sewers, and the management of liquid and solid waste. The BCH is also tasked with ensuring food hygiene and tackling vector-borne diseases. Furthermore, it is responsible for monitoring and controlling the hygiene of industrial and small manufacturing facilities, workshops and construction sites and the hygiene conditions for employees. It should be noted that the BCHs have played a predominant role in managing the COVID-19 crisis at the local level.

The Civil Defence Directorate is responsible for protecting and defending the population and civil assets in all circumstances.

Ministry of Economic Inclusion, Small Business, Employment and Skills

The Ministry of Economic Inclusion, Small Business, Employment and Skills is tasked with drafting and implementing government policy in the areas of work, employment and social welfare, and for evaluating the action plans concerned. This is done in collaboration with the various ministries. Its particular mission is to promote occupational medicine and occupational risk prevention. It also has a role in promoting and controlling the implementation of safety and social welfare regimes and employee medical cover.

National Institute of Hygiene

The INH is a constituent body of the Ministry of Health and Social Welfare. Its mission is to provide technical and scientific support to the various public health programmes. In addition, it delivers services and expertise in the areas of medical biology and environmental health. It operates as part of national and international networks in areas relating to health monitoring, observation and health security. It also plays a role as coordinator of a national network of public health laboratories. Its sphere of competence includes contributing to training stakeholders and conducting health studies and research in partnership with national and international bodies.⁴²³

Pasteur Institute of Morocco

The fields of activity developed within this institution involve scientific research, biological analyses, food and environmental security services and production of biological products. The Institute includes the

Department of Product, Food and Environmental Safety (PAE). This Department comprises the Microbiology Division, with a department dedicated to PAE microbiology and one devoted to PAE virology and parasitology, and the Physicochemical and Toxicology Division, which is split into two departments dealing specifically with PAE physicochemistry and toxicology. There is also a department providing risk-management training, technical assistance and support for consumer and environmental products to guarantee better quality and hygiene control.⁴²⁴

National School of Public Health

Founded in 1989, the National School of Public Health is responsible for training health-sector managers. The main areas of training are health administration and public health, hospital management, managing health programmes and public health epidemiology. Environmental health is not a subject that is specifically taught.

Moroccan Society of Clinical and Analytical Toxicology

The Moroccan Society of Clinical and Analytical Toxicology, founded in 2003, brings together doctors, pharmacists, biologists, veterinarians and scientists to foster a discipline for all aspects of poisoning – diagnosis, treatment, epidemiology and prevention. The aim of the Society is to promote health security and vigilance in relation to toxic risks, improve the care and treatment of individuals who are poisoned, and enhance and develop analytical toxicology in the care and treatment of patients.

National Observatory on Drugs and Addiction

The Moroccan National Observatory on Drugs and Addiction specializes in tracking developments and trends in drug consumption and associated health problems. It also produces useful information for policymaking relating to drugs and drug addicts in the country. The dedicated website offers access to information/awareness-raising leaflets, but currently does not allow access to data.

National Institute of Working Conditions

The National Institute of Working Conditions works with all national and international health and occupational safety actors to promote a culture of risk

⁴²³ http://inh.ma/?page_id=92.

⁴²⁴ www.pasteur.ma.

prevention in the workplace. Its action plan is based on cultivating expertise, training and informing, to guide public and private measures designed to improve working conditions.⁴²⁵

The Department for Evaluating and Monitoring Exposure at the Institute helps detect, diagnose and analyse occupational risks and undertakes research and applied studies in the field of health and safety at work to improve working conditions. It represents a technical database of corporate occupational risk management. The department has three units – on occupational safety, industrial hygiene and toxicology and the ergonomics and organization of work.

National Radiation Protection Centre

The National Radiation Protection Centre is a public body specializing in protecting the public from radiation. A key service supporting the Ministry of Health and Social Welfare and the public authorities, the Centre contributes to the safety of nuclear and radiation installations and to the radiation surveillance of Moroccan territory, foodstuffs and water. It participates in monitoring the radiation levels in individual workers exposed to ionizing radiation and controls the quality of medical devices and sources of ionizing radiation. Prior to 2016, it also undertook statutory inspections, which were transferred, on 26 October 2016, to the AMSSNuR following its creation under the provisions of Law No. 142-12.

National Centre for Nuclear Energy, Science and Technology

CNESTEN has a threefold remit: research, technical consultancy and support for the authorities, and service provision. The Centre commercializes radiopharmaceuticals for the benefit of nuclear medicine services.⁴²⁶

Coordination with institutions tasked with protecting the environment at the national, regional and local levels

In order to tackle the impacts of the state of the environment on health, ministries must effectively coordinate their action at the national and local levels. Environmental health is an issue that cuts across all areas. It implies a global vision and demands a grasp not only of the quality of living conditions but also of health and its multiple environmental, social and economic determinants.

Health protection appears in regulatory texts issued by various ministries. This is notably the case with texts relating to food and drinking-water safety and to occupational health. Health impacts also feature in the health section of impact studies that are required as part of an environmental assessment of development and infrastructure projects. The ministry in charge of the environment has an environmental health department and works with the Ministry of Health and Social Welfare, particularly to control the dangers and risks posed to human health and the environment by chemical substances.

Ministries are assisted in rolling out their policies by their provincial and regional directorates. The countrywide network of laboratories monitors the environment and intervenes on behalf of the various ministries. For example, air quality monitoring involves several agencies – the Department of Sustainable Development, DGM, Ministry of the Interior and Mohammed VI Foundation for the Protection of the Environment. Monitoring and improving bathing water quality is another example of multisector collaboration. It involves different ministries, departments, institutes and local authorities, and civil society.

For checks on food safety compliance, the Ministry of Health and Social Welfare and Ministry of the Interior work together with the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests. Bodies that answer to other authorities – the Ministry of Justice, the Customs and Excise Administration, the Judicial Police and the Royal Gendarmerie – are also involved in this work. However, their contributions remain extremely limited and essentially take the form of providing the assistance and support required by the agencies concerned on specific aspects or as part of one-off operations.

Several ministries work together with the government body responsible for employment as part of occupational health and risk prevention. These include the Ministry of Health and Social Welfare, the Ministry of Energy Transition and Sustainable Development, the Government Equipment Agency and AMSSNuR.

In accordance with a joint ministerial decision, interministerial committees were created at the national, regional and provincial levels. They are called on to produce regional and provincial action plans specific to their context as part of IVM, which

⁴²⁵ <https://incvt.ma/?lang=fr>.

⁴²⁶ www.cnesten.org.ma/cnesten.php.

remains the principal tool in the fight to control vectors in Morocco. These actions support the implementation of Recommendation 10.10 of the first EPR.

Morocco hosted the 22nd Conference of the Parties to the UNFCCC (COP22) in Marrakesh, 7–18 November 2016. The DELM played an active role in the health-related preparation and coverage of COP22 and guided participation by the then Ministry of Health in the event. A side event was organized in the COP Blue Zone to inform national and international partners, raise awareness of the level of knowledge of climate-change-related health risks in Morocco, prompt discussion and jointly identify effective measures and action.

During COP22, Morocco and WHO hosted a Ministerial Conference on Health, the Environment and Climate to launch a global strategic alliance between the health and environmental sectors as a way of countering the health impacts associated with climate change. The Conference concluded with the signing of the Ministerial Declaration on “Health, Environment and Climate Change” by the ministers of health and/or the environment from many countries, including Morocco.

Evaluating the cost of environmental impacts on human health

In 2013, GDP per capita was estimated to be US\$3,108 and total health spending per capita was estimated to be US\$195, equivalent to 6.3 per cent of GDP.

According to the HCP, the number of inhabitants per health professional dropped from 1,925 in 2013 to 1,383 in 2017 (SDG indicator 3.c.1). No information is supplied for SDG indicators 3.d.1 and 3.d.2.

National Cancer Prevention and Control Plan 2020–2029 in figures

The budget allocated to the PNPPC 2010–2019 was close to 8 billion dirhams. The largest proportion (56.5 per cent) was devoted to medicines and to running facilities (21.7 per cent). Seven per cent of the overall budget of the plan for 2010–2019 was earmarked for health prevention, with most activities linked to lifestyles and living conditions. During the first five years, more than 35 per cent of the budget allocated to prevention was spent on curbing smoking. Between 2.5 and 3.5 million dirhams were directed annually at

smoking cessation. The annual budget allocated to infection control rose from 1.5 million dirhams for 2010–2014 to over one billion dirhams for the period 2015–2019.

Totalling 7.8 billion dirhams, the provisional budget of the PNPPC 2020–2029 is similar to that for the previous Plan. The largest proportion (74 per cent) is devoted to care and treatment – developing and equipping palliative care units, training and research, and medicines. Representing 15 per cent of the overall budget, the prevention component has a budget of one billion dirhams, of which almost 60 million dirhams are devoted to smoking cessation and to promoting a healthy lifestyle. The budget allocated to palliative care (excluding equipment) represents 1 per cent of the overall budget, cross-sector areas account for 2 per cent and the remaining 4 per cent is assigned to miscellaneous expenditure.⁴²⁷

According to the findings of a 2017 study,⁴²⁸ the attributable fraction for smoking-related lung cancer in Morocco was 87 per cent. Thus, 3,049 cases of cancer in men could be avoided if tobacco consumption were removed from the equation. In the population overall, a reduction of 10 per cent of the current prevalence of 18.1 per cent could avoid almost 350 cases of lung cancer and a reduction of 20 per cent could avoid 700 cases of lung cancer. The cost thereby avoided would be US\$4.2 billion and US\$8.4 billion respectively.

Cost of exposure to air pollution

A 2017 study⁴²⁹ estimated the cost of premature mortality due to ambient air pollution in Morocco to be between US\$420 million and US\$1.15 billion, based on an estimated mortality of between 2,200 and 6,000 deaths per year. The cost of morbidity attributable to ambient air pollution is estimated to be between US\$42 million and US\$115 million (10 per cent of the cost of mortality). The cumulative cost of mortality and morbidity attributable to ambient air pollution in Morocco is therefore considered to be between US\$462 million and US\$1.26 billion, with an average of US\$863 million.

The cost of mortality attributable to indoor air pollution is estimated to be between US\$248 million and US\$271 million. The cost of morbidity attributable to indoor air pollution is estimated to be between US\$25 million and US\$27 million. The cumulative cost is therefore estimated to be between

⁴²⁷ www.contrelecancer.ma/site_media/uploaded_files/PNPCC_2020_2029.pdf.

⁴²⁸ www.em-consulte.com/article/1120550/la-fraction-attribuable-du-cancer-du-poumon-lie-au.

⁴²⁹ www.scirp.org/journal/paperinformation.aspx?paperid=79181.

US\$273 million and US\$298 million, with an average of US\$285 million.

The average cost of (ambient and indoor) air pollution is calculated to be US\$1.14 billion, with the cost attributable to ambient air pollution representing almost 75 per cent of this total.

Cost of inadequate drinking water supply, sanitation and hygiene

In 2014, the cost of deaths due to diarrhoeal illnesses resulting from deficiencies in the drinking-water supply, sanitation and hygiene services was estimated to be between 1.45 billion dirhams and 1.58 billion dirhams, with an average of 1.51 billion dirhams. The cost of diarrhoeal morbidity associated with water-related determinants was estimated to be 592 million dirhams. In addition, the cost of treating and caring for diarrhoeal illnesses totalled approximately 460 million dirhams. Overall, diarrhoea-related costs resulting from improper practices associated with water, sanitation and hygiene were assessed at almost 2.57 billion dirhams. The cost of malnutrition due to water-related determinants was 469 million dirhams. Thus, the estimated cost of the health impacts of inadequate practices in drinking-water supply, sanitation and hygiene was in the order of 3 billion dirhams or 0.33 per cent of Moroccan GDP.⁴³⁰

Cost of exposure to lead

A 2017 World Bank report on the cost of environmental degradation in Morocco calculated the health cost of exposure to lead in Morocco using mathematical models.⁴³¹ Thus, the average load of lead poisoning in Moroccan children under five years of age was calculated to be 6.64 µg/L (+/-3.81). In 2014, approximately 1.8 children per 1,000 – equivalent to around 1,980 cases – were suffering from a moderate delay in mental development. Analysis of the relationship between the moderate developmental delay and the number of years spent with a disability resulted in a total of approximately 23,495 years spent with a disability for these 1,980 cases. The estimated financial cost of these years spent with a disability, namely, the cost of exposure to lead for children under five years of age in Morocco, was calculated to be 642.8 million dirhams. The report emphasizes the importance from a health perspective of reducing, and indeed eliminating, the sources of exposure to lead. The report also specifies that the costs incurred by screening at-risk populations would

be offset by the health costs avoided. The report provides an example of simple measures to apply, such as installing bag filters in industrial chimneys, which would drastically reduce lead emissions into the atmosphere and thus minimize exposure. Regulatory limits and controls on industrial emissions could represent a valuable and effective mechanism for minimizing exposure.

13.5 Assessment, conclusions and recommendations

Assessment

Important progress has been achieved in the field of health over the past decade, notably concerning maternal and child health. The rollout of health facilities and the extension of medical insurance are contributing to the improvement in these health indicators. Major health inequalities persist, however, depending on whether people live in urban or rural areas.

The incidence of communicable diseases – excluding the exceptional COVID-19 crisis that has been ongoing since 2020 – continues to decrease, while chronic and non-communicable diseases are on the rise and represent the principal cause of mortality. Morocco has achieved some health-related Millennium Development Goals, while others are in the process of being attained. But efforts must be stepped up in the case of some indicators that are still far from reaching their target.

The environment has a significant impact on health in Morocco. Air quality remains a major issue and is monitored by measuring stations across the country. Air pollution, including indoor pollution, causes most harm to population groups in the age brackets of 0–4 years and over 45 years. The quality of indoor air, whether in homes or public buildings (notably those used by children), is not an integral part of public policy. The action taken by the public authorities to curb smoking and the downward trend in the number of smokers, particularly among young people, are worthy of note.

Recommendation 10.7 of the first EPR on the subject of introducing an early warning system in the event of extreme air or water pollution episodes, is being pursued in the case of air pollution. The regulatory framework specifying the methods for warning and informing the population has already been set out in a

⁴³⁰ <https://documents1.worldbank.org/curated/en/741961485508255907/pdf/105633-WP-P153448-FRENCH-PUBLIC-Moroc-Etude-CDE-Final-logo-Janv-2017.pdf>.

⁴³¹ Ibid.

decree, but by the April 2022 this had still not been implemented. Elsewhere, Recommendation 10.6 of the first EPR on promoting eco-epidemiological research to assess the impact of air pollution on health is ongoing following development of a pilot site in Greater Casablanca.

The improvement in the quality of supply networks for access to drinking water and their significant deployment should be highlighted. By reducing waterborne diseases and introducing better hygiene, these improvements are helping reduce communicable diseases. However, major disparities may be observed between urban and rural areas. Residents in urban areas, where there is a relative preponderance of informal housing in peri-urban zones, benefit from better access to drinking water and better quality water, compared with inhabitants in rural areas.

Action is currently being taken on Recommendation 10.9 concerning implementing safe drinking-water supply plans. In 2020, Morocco adopted a national standard for water safety plans. However, by the first half of 2021 this had still not been effectively implemented.

On the issue of bathing water quality, bathing profiles and associated action plans have been developed over the past decade in response to Recommendation 10.3 of the first EPR. The drafting of these profiles has provided an opportunity to develop measures to improve sanitation and waste in the natural environment and thus to improve bathing water quality. Further action along these lines needs to be taken. Some profiles still have to be produced, and a minority of bathing sites regularly fail to comply with statutory values. In addition, certain preventative management measures relating to the bathing profiles could usefully be implemented.

Food safety has been enhanced since the first EPR with the adoption of several regulatory texts. In particular, these texts establish the limit values for chemical and microbiological contaminants, thus responding in part to Recommendation 10.8 of the first EPR. The number of mass outbreaks of foodborne illnesses has remained stable over the past 10 years.

Two issues should be highlighted that have engendered no action despite being quite well documented. These are lead poisoning observed in some population groups, particularly children, and the health impacts of former mining sites on nearby populations. Few epidemiological studies and little medical monitoring of these populations have been undertaken. Although, in some cases, impregnation of the surrounding environment is known to have

occurred, no remedial action has been taken, thus leading to continued exposure.

Large-scale programmes are tackling the issue of dilapidated housing. Rehousing helps families find decent homes, but sometimes the programmes move them to locations without medical, social, administrative or transport infrastructure. Housing is not considered globally and nor is it part of a multisector policy. As an environment in which people live, housing has a major impact on health, given its social, environmental and economic determinants. The problem of asbestos is rarely tackled by the authorities, although asbestos constitutes a proven public and occupational health problem.

Vector-borne diseases continue to pose a major challenge for Morocco, particularly in the light of climate change. The objective of Recommendation 10.9 of the first EPR, relating to rolling out IVM across the country, has been achieved. Vector control was the subject of a 2014 interministerial decision and is being effectively implemented throughout the country via 12 regional committees.

In the field of occupational health, Morocco has made notable progress over the past 10 years. In 2017, the country produced a national profile for health and safety at work. The profile was in preparation for the National Policy and Strategy for Occupational Safety and Health produced in 2020. This work relates to the application of ILO Convention No. 187. Other international conventions on occupational health are still waiting to be ratified, however.

It is government policy to integrate health into all policies, but the same rarely applies in reverse. Public health policies rarely incorporate determinants – and particularly environmental determinants – into health plans and programmes. Some social, environmental and behavioural determinants are taken into account in health-related plans (e.g., the cancer plan and national health strategy), but this is mainly limited to air quality, nutrition, curbing smoking and encouraging physical exercise. In addition, the ORS do not integrate environmental factors into their indicators. These multifaceted factors and their impact on health are increasingly well understood. There has been no follow-up to Recommendation 10.4 of the first EPR, which suggested that an environmental health information system be developed.

Health scientists and professionals in Morocco produce scientific data and articles that highlight the impacts of the environment on health in the country. Warnings and recommendations issued by these

bodies are not always taken into account or followed up with management measures. Other than scientific outputs and reports by international institutions, little in the way of national environmental health data is available. Given the multisector nature of environmental health, the data and reports that are available are circulated to different ministries and institutions.

Numerous plans and programmes are produced in the health and environmental fields. However, few are the subject of review or evaluation, making it extremely difficult to comprehend what effective action is being taken. In addition, few links exist between the various plans. The review of activities undertaken at the local level in the environmental health field does not appear to be the subject of any feedback at the national level. These activities could be analysed and incorporated as indicators to ensure that environmental health policies are monitored and adjusted.

The environmental health plan produced prior to 2010 has never been effectively implemented. Other than the framework for the activities and missions undertaken by the DELM Environmental Health Division, no plan or programme exists in the highly specific, cross-cutting area of environmental health. Recommendations 10.1 and 10.2 of the first EPR, concerning the drafting of a legal framework on health and the environment, have not been fulfilled.

When drafting and implementing its environmental health policies, the Ministry of Health and Social Welfare has the support of the DELM Environmental Health Division and the teams deployed at the regional and local levels. No study has been conducted to ensure that the human resources allocated are sufficient for the missions involved to be accomplished, in what is a relatively broad field. These professionals, doctors, engineers, administrators and technicians do not have a documentary and regulatory database on environmental health available to consult. In addition, the National School of Public Health does not offer training in environmental health and in risk analysis and prevention in this field.

Morocco has made significant progress in the health and environmental fields over the past decade. However, there has been little progress in taking environmental determinants into account and integrating them into public policy. The same applies to environmental health measures that have not been implemented other than in specific areas. Most of the recommendations put forward during the first EPR still apply.

Conclusion and recommendations

National Programme for Health and the Environment

Collaboration among ministries is essential when it comes to subjects relating to environmental health. The public authorities have access to the data and expertise of academic staff, scientists and health professionals to enable them to identify significant environmental factors in the country and thus to establish environmental health policy. The National Programme for Health and the Environment, drawn up in 2010, has not been implemented entirely and no national plan or programme identifies the priorities and measures to take in the area of environmental health. Such a strategic document makes it possible to draw together the different actors and to promote the interdisciplinary and interministerial approach that is indispensable in this area.

Recommendation 13.1:

The Ministry of Health and Social Welfare and the Department of Sustainable Development should sign a partnership agreement for implementing the national environmental health programme.

Recommendation 13.2:

The Ministry of Health and Social Welfare and the Department of Sustainable Development, together with the ministries concerned and relevant actors in the field at the national and local levels and within civil society, should:

- (a) *Update the national environmental health programme, including redefining the national priorities, objectives, allocated budget and actions to take;*
- (b) *Integrate indicators to monitor progress and conduct assessments of the progress made in implementing the actions;*
- (c) *Establish a national committee and regional committees to monitor the implementation of the national environmental health programme;*
- (d) *Underpin the rollout and implementation of regional environmental health programmes with targeted actions to ensure they are effectively realized at local level.*

Environmental health information system

An environmental health information system, which, on the one hand, incorporates a centralized database with indicators that meet WHO standards and, on the other hand, includes a documentary and regulatory database that brings together strategic environmental

health documents, regulatory texts and information, is currently lacking. Environmental health data are scattered and are often missing, making it difficult to evaluate, guide and implement public environmental health policy.

Recommendation 13.3:

The Ministry of Health and Social Welfare and Department of Sustainable Development, and the ministry responsible for internal affairs, regional departments and regional health and environmental observatories, in collaboration with the High Commission for Planning, should draw up two environmental health information systems:

- (a) *One for internal use by administrative staff at the national, regional and local levels to facilitate the steering and operational implementation of environmental health policies and the drafting of reviews based on extracted data;*
- (b) *The other for public consultation (e.g., via the ministry responsible for the health website) in order to share warning and prevention messages, raise the awareness of the population of environmental health, inform regulatory mechanisms and communicate data on environmental health.*

Controlling air pollution

Air pollution, for which an assessment of the health costs is available, remains a significant contributory factor to the deteriorating health of the Moroccan population. The country has measuring stations providing pollution indicators.

The regulatory framework provides for suitable local management measures to be deployed to safeguard the health of the population, but these are not implemented. The impact on health of indoor air quality has also been calculated in Morocco at a time when new lifestyles are leading humans to spend the majority of their time in an enclosed environment, such as at home or in the workplace and public buildings, notably those used by children.

Recommendation 13.4:

The ministry responsible for health and the ministry responsible for the environment, in cooperation with relevant stakeholders, should:

- (a) *Implement the established regulatory measures, particularly concerning managing spikes in air pollution, in order to safeguard the health of the population;*

- (b) *Carry out diagnostics of indoor air quality, assess its impact on health and develop specific actions;*
- (c) *Undertake a diagnosis of indoor air quality, especially inside buildings used by children;*
- (d) *Take specific preventative actions concerning risks, especially regarding risks associated with carbon monoxide and fine particulate matter.*

Protecting the water resource

The commitment shown by actors in the water sector has led to a countrywide improvement in the quality of the water supply. Major disparities persist from region to region, however. Access to consistently good quality drinking water remains a significant challenge, particularly in rural areas. Access to water, hand-washing facilities and sanitation, especially within schools, is an ongoing public health issue in rural areas. There is also a gender-related aspect to this issue as it has a greater impact on girls.

Work is under way to protect water resources by establishing protective delineated areas. However, managing pollutants, such as pesticides and nitrates, does not figure in any overview to ensure they are controlled and to guarantee minimal levels in water destined for human consumption. Drinking-water health inspections are the responsibility of the ministry responsible for health and are undertaken at the local level. The data produced do not lead to publication of a national review and do not provide an overall perspective. Although a guide to setting up plans for water management and sanitary safety has been published, the plans have not been implemented.

Recommendation 13.5:

The Ministry of Health and Social Welfare, in cooperation with relevant stakeholders, should:

- (a) *Continue the programmes for monitoring and sanitary control of drinking water, especially of zones supplied with water resources contaminated with nitrates and pesticides;*
- (b) *Make mandatory the national standard for plans for the management and sanitary safety of drinking water.*

Eliminating lead poisoning and preventing exposure to lead

Morocco has no global health approach to tackling lead poisoning and preventing exposure to lead. The impact of lead poisoning is well known, the sources of exposure have been well documented, and the health costs have been calculated. The presence of lead in the

home, particularly in the form of lead paints, cosmetics and kitchen utensils, has not been assessed and is not the subject of any specific prevention policy.

Recommendation 13.6:

The Ministry of Health and Social Welfare should:

- (a) *Carry out epidemiological surveys, integrating environmental surveys, to detect cases of lead poisoning, notably in young children, and identify the sources of exposure to lead;*
- (b) *Organize prevention measures on the impact of lead poisoning on health directed at the population and public health actors.*

Industrial, mining and small manufacturing sites

Environmental exposure to harmful substances, such as proximity to industrial, mining or small manufacturing sites, has been specifically highlighted, but this has not prompted either the monitoring of impregnation of the surroundings or medical follow-up of the exposed populations.

Recommendation 13.7:

The Ministry of Health and Social Welfare, together with the relevant stakeholders, should be particularly vigilant as regards these polluted industrial and mining sites and should conduct studies to determine the degree of impregnation in the exposed populations and adapt the medical follow-up of these populations accordingly.

Housing

Housing quality encompasses multiple health determinants and is thus a priority issue. The Government employs programmes that are designed to gradually reduce slums and dilapidated and informal housing. These programmes contain little relating to health determinants – such as societal, environmental, economic and mobility aspects – and tend to relocate these populations some distance from towns and cities. Housing policy needs to assume a multisector dimension.

Recommendation 13.8:

The ministry responsible for national planning, urban planning, housing and city policy should:

- (a) *Integrate the health component in the inventory and diagnosis of unsanitary housing in the country;*
- (b) *Continue to implement and develop programmes of measures for upgrading urban*

housing, aimed at reducing the housing and equipment deficit.

Integrating environmental health into sectoral policies

Morocco is keen to integrate health into sectoral policies. Developing a positively healthy environment demands an integral vision of health and health determinants within urban planning and land-use development projects. Health impact studies are useful tools for assessing in advance the impacts of public works on the health of populations. On a smaller scale, the health components of EIAs also provide an effective means to assess the impact of a development or infrastructure project on health. Identifying and drawing up advocacy in favour of a development that has a positive impact on health is also a way of raising awareness and providing a framework for local authorities and developers.

Recommendation 13.9:

The Government should:

- (a) *Strengthen the integration of environmental health into sectoral policies;*
- (b) *Include the health component in the environmental assessments.*

Occupational medicine

Only a small proportion of the working population has occupational medicine cover. There are copious amounts of occupational health and safety data, and numerous regulatory texts govern health and safety at work. In 2020, Morocco produced its National Strategy for Occupational Safety and Health, and a 2020–2024 executive programme is currently being drafted.

Several international conventions on health and safety at work have been ratified, but some are still awaiting ratification. The ILO conventions that have not been ratified include the conventions on protection from radiation (C115), safety and health in agriculture (C184), safety and health in construction (C167), occupational health services (C161), worker safety and health (C155), occupational cancer (C139) and the working environment (C148).

Recommendation 13.10:

The Ministry of Health and Social Welfare, together with the Ministry of Economic Inclusion, Small Business, Employment and Skills and the ministries concerned, should:

- (a) Finalize and implement the five-year occupational health and safety programme;
- (b) Develop an information system for occupational health and safety that incorporates a database of indicators in accordance with international recommendations.

Recommendation 13.11:

The Government should consider ratifying the international conventions on occupational health and safety, such as those on protection from radiation (C115), safety and health in agriculture (C184), safety and health in construction (C167), occupational health services (C161), worker safety and health (C155), occupational cancer (C139) and the working environment (C148).

Chapter 14

INDUSTRY AND THE ENVIRONMENT

14.1 Development and trends in industry

According to the High Commission for Planning (HCP), the contribution of industry to overall GDP remained essentially the same between 2016 and 2018 (around 17.8 per cent) but dropped to 16.9 per cent in 2019. The value added from manufacturing as a proportion of GDP and per capita (SDG indicator 9.2.1) remained stable, as in 2016 (± 15.7 per cent).

Furthermore, in the 2020 VNR, employment in manufacturing as a proportion of total employment (SDG indicator 9.2.2) registered a slight increase, from 11.2 per cent in 2015 to 12 per cent in 2018. The annual growth rate of real GDP per employed person (SDG indicator 8.2.1) dropped from 3.3 per cent in 2014 to 1.7 per cent in 2018.

Industrial exports accounted for more than 85.5 per cent of Morocco's total exports in 2019 and amounted 243.264 billion dirhams. The average growth rate between 2014 and 2018 was 8.2 per cent, mainly due to the automotive and aeronautics industries.

During the last few years, the fact that the Government adopted reforms that made investment in Morocco more appealing contributed to increasing the flow of foreign direct investment (FDI), which reached 33.5 billion dirhams in 2018, making Morocco the fourth largest recipient of FDI in Africa.⁴³² Eighteen per cent of total FDI was allocated to the industrial sector in 2018, ranking it second only to the insurance sector. A national survey of commercial enterprises undertaken by the HCP⁴³³ shows that 64 per cent are very small enterprises, 29 per cent are small and medium-sized enterprises (SMEs) and 7 per cent are large enterprises. It also indicates that industry accounts for 9.9 per cent of all Moroccan enterprises, outranked by the trade and the construction sectors (table 14.1). There are more women leaders in the service sector than in industry, especially in younger companies, of which 12.8 per cent are managed by women.

This survey also indicates that 68 per cent of the industrial enterprises are located in the Casablanca-Settat region, and 15 per cent in the Marrakesh-Safi

region (table 14.2). Further, 84 per cent of the jobs in industry are located in the Casablanca-Settat region. In terms of export, 41 per cent of the exporting companies are in the industrial sector and 60 per cent of those are large companies.⁴³⁴

Table 14.1: Enterprises per sector, percentage

Sector	Very small	SME	Large	Total
Industry	7.7	10.9	25.8	9.9
Construction	20.9	21.2	22.9	21.1
Trade	27.9	26.5	27.5	27.5
Services	43.5	41.5	23.8	41.5
Total	100.0	100.0	100.0	100.0

Source: HCP, National Survey of Enterprises: Preliminary Results, 2019.

Table 14.2: Geographic breakdown of industry and employees, number

Location	Enterprises	Employees
Casablanca-Settat	3 097	270 455
Marrakesh-Safi	674	23 141
Souss-Massa	396	20 605
Laâyoune-Sakia El Hamra	248	5 797
Drâa-Tafilalet	62	984
Eddakhlâ-Oued Eddahab	29	353
Guelmin-Oued Noun	24	723
Total	4 530	322 058

Source: HCP, National Survey of Enterprises: Preliminary Results, 2019.

To expand its global industrialization offer, Morocco created industrial zones (ZIs) and industrial parks for rent (PILs) and has now added integrated industrial platforms (P2Is), which provide a one-stop-shop, a pool of local workers, ad hoc services and training sessions. Some are classed as free trade zones. Between 2011 and 2018, despite a production downturn, the chemicals and paracheicals sector ranked first among the main industrial sectors. Second was the agrifood industry, whose production level remained stable. A considerable increase in production in the mechanical and metallurgic sector put it in third place. In fourth place was the electrical and electronics industry, followed by the textile and leather industry (table 14.3).

⁴³² <https://unctad.org/topic/investment/investment-statistics-and-trends>.

⁴³³ www.hcp.ma/Enquete-nationale-aupres-des-entreprises-2019_a2405.html.

⁴³⁴ Ibid.

Table 14.3: Value of industrial production by major sector, 2011–2018, millions of dirhams

Industry sector	2011	2012	2013	2014	2015	2016	2017	2018
Chemicals and parachemicals	174 964	175 985	165 018	158 748	132 065	115 719	106157	105586
Agrifood	102 027	106 300	107 202	105 197	103 754	107 179	25880	26129
Mechanical and metallurgic	57 127	56 759	66 429	71 680	78 127	85 239	118860	136583
Electrical and electronics	27 223	26 669	29 002	31 180	33 650	32 619	91448	98926
Textile and leather	26 333	26 000	24 398	24 055	23 775	25 929	37174	40476

Source: HCP, National Survey of Enterprises: Preliminary Results, 2019.

Note: According to the Moroccan nomenclature for economic activities.

Photo 14.1: Clothing factory, Tangier

Photo credit: Eduardo Lopez Coronado, <https://depositphotos.com>.

*Development of main industrial branches*⁴³⁵

Automotive

Since 2015, automobiles have been the main national export product in a sector with sales value reaching over 80 billion dirhams in 2019, against 42.8 billion dirhams in 2014. The average annual growth rate of the sector is 14.1 per cent, with close to 148,000 jobs created in 2019. Morocco is Africa's top producer and exporter of motor vehicles and equipment.

Aeronautics

This sector has been important in the creation of new professions with high added value. At present it is composed of more than 142 enterprises, has created close to 11,313 direct jobs and had a turnover of 15.6 billion dirhams in 2019. Exports have risen steadily,

with a strong annual growth rate that exceeded 20 per cent.

Textiles

The textile sector is strategic for domestic industry, representing 17.7 per cent of the companies in the industrial sector and providing 97,265 jobs, which account for 21 per cent of all jobs in industry.

Leather

This sector represents 3.9 per cent of the industrial enterprises, accounting for over 4 billion dirhams' value in exports and providing 6,347 jobs in 2019.

⁴³⁵ <https://mcinet.gov.ma/>.

Chemicals and paracheicals

The chemicals and paracheicals industries play an important role in the domestic economy (12.5 per cent of the total industrial enterprises), providing 15,152 jobs in 2019, or 4.6 per cent of the jobs in the industrial sector. Further, in this sector, OCP accounts for 52 per cent of sales, 90 per cent of exports, 67 per cent of investments and 22 per cent of jobs.

Pharmaceuticals

In the Moroccan chemicals industry, pharmaceuticals are second only to phosphates, and are also ranked second on the African continent. Pharmaceuticals account for 0.5 per cent of Moroccan exports (worth 1.3 billion dirhams in 2019) and provide jobs for close to 3,500 people.

Mechanical and metallurgic industries

The mechanical and metallurgic industries accounted for 13.7 per cent of the industrial sector in 2019, generating about 82 per cent of exports (6.6 billion dirhams in value in 2019), 94 per cent of investments, 91 per cent of production and 82.6 per cent of jobs.

Electricity

Although they represent only 31 per cent of the companies in this industrial sector, manufacturers of insulated cable and wire and of electrical controls and distribution equipment generate 86 per cent of the exports, 79 per cent of investments, 72 per cent of production and 65 per cent of the added value.

Electronics

This sector has been steadily growing during the last few years thanks to new opportunities, namely, the development of products with high added value, the arrival of better integrated subcontractors and the increased importance of electronics in automobiles, aeronautics, railroads, renewable energy and defence. This sector intends to become a platform for production and exports to Europe.

Construction materials

During the last few years, and as a result of the government's sectoral policy on using housing,

tourism and industry as drivers of growth, the construction materials industry has enjoyed unprecedented development. It accounted for 7.4 per cent of national industry and generated more than 13,000 jobs (3.9 per cent of the jobs in industry) in 2019.

Renewable energy

Morocco has launched a massive integrated programme for producing electricity from renewable energy sources by setting up new wind turbine parks and building five solar electricity installations. Completing this project will make it easier to develop industries that use renewable energy and ensure energy efficiency.

Relocated enterprises

Offshoring is a promising sector for the domestic economy thanks to its potential to create jobs for young people and contribute to the country's trade balance. In 2019, the sector involved more than 1,000 enterprises and provided 78,000 jobs, with exports exceeding 14 billion dirhams in value.

Developments in the mining industry

The mining sector is an essential component of Morocco's social and economic development. In 2017, it accounted for close to 10 per cent of GDP, and about 80 per cent in volume and 20 per cent in income of exports, besides creating some 41,000 direct and indirect jobs.⁴³⁶ According to the Department of Energy and Mines, the phosphate subsector is one of the main pillars of the Moroccan economy, accounting for about 90 per cent of national mining production. Morocco has 73 per cent of the world's phosphate reserves. The OCP SA Group is the major player in the production and export of fertilizers, phosphoric acid and phosphate ore.

The production index for the Moroccan extractive industry dropped from 102 to 99.5 between 2012 and 2015 but then gradually rose to 127.7 in 2018.⁴³⁷ This increase is mainly a result of increases in various extractive products, especially phosphates, production of which rose from 27,060 tons in 2012 to 34,315 tons in 2018 (table 14.4). Morocco also mines barite, copper, zinc, iron and lead.

⁴³⁶ www.mem.gov.ma/.

⁴³⁷ HCP. (Base 2010 = 100).

Table 14.4: Trends in mining production, 2012–2018, thousands of tons

	2012	2013	2014	2015	2016	2017	2018
Phosphate	27 060	n.d.	n.d.	26 264	26 928	32 842	34 315
Barite	1 021	1 094	1 007	1 213	677	818	n.d.
Copper	59	46	66	73	119	126	n.d.
Zinc	91	82	90	106	106	102	n.d.
Iron	261	301	23	18	21	100	n.d.
Lead	39	44	39	47	42	54	n.d.

Source: HCP, 2021.

14.2 Practices and trends for chemical products

Major industrial accidents can occur in facilities that produce, handle, store and/or dispose of hazardous substances, or during their transport. In Morocco, this risk exists not only in chemical installations located in the industrial zones, such as Mohammedia Port or Jorf Lasfar, but also in the many industrial facilities that use diesel, oil or gas (propane, butane) as fuel and other dangerous chemical substances. Furthermore, these substances are often transported through highly populated areas, creating an additional risk for the resident populations.

Production/utilization

In Morocco, chemicals are used in a number of industrial processes, especially in petrochemistry, oil refineries, storage facilities for hydrocarbons, butane and propane, phytosanitary products, fertilizers, storage facilities and workshops for explosives, metallurgic factories, agrifoods (sugar mills, distilleries), glass factories, industrial gas storage, ammonia storage facilities for fertilizer production, and mines. Moreover, hazardous chemical products are included in a large variety of economic activities and account for a significant proportion of Moroccan industrial production, especially solvents, hydrocarbons, fertilizers and pesticides production.

Hazardous industrial waste also contains chemical products, such as solvents (flammable), ammonium nitrates and perchlorates (explosive), acids (corrosive), pesticides, PCBs and dioxins, and furans. The 2015 Decree No. 2-14-85 on the management of hazardous waste obliges industry to adopt an internal management plan for the collection, storage, transport, treatment and traceability of industrial waste, and to submit annual reports to the governmental authority responsible for the environment.

Information

The list of users of dangerous chemicals in Morocco was compiled drawing on an inventory taken under the

Risk Prevention Plan for the Management of Hazardous Chemicals. This list includes 398 industries and two public institutions (table 14.5). The list of users of hazardous products by sector confirms the predominance of the chemicals and paracheicals industries, followed by the agrifood industry. The inventory also led to the production of a list of 224 chemicals identified as dangerous. Safety files for these products were prepared and recorded in a broad register.

To improve information-sharing on chemical products, the Department of Sustainable Development, with support from UNEP and the United States Environmental Protection Agency, created the National Chemicals Information Exchange Network, the purpose of which is to use the Internet to share the scientific, technical and legal information needed to make appropriate decisions for the sound management of chemical products.

To implement the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Morocco has undertaken several actions including the review of chemical imports applications for chemicals banned or severely restricted at European Union level, review of export notifications (NE) of chemicals for chemicals prohibited or strictly regulated at the level of the European Union, the review of applications for imports of chemical products by Moroccan companies and the development of a database of chemical products for industrial use subject to import notifications to Morocco.

Further, in 2011, a technical guide was prepared for the application of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), mainly to help producers, exporters, importers and distributors classify, label and package chemicals according to GHS criteria before marketing them and prepare the corresponding safety data papers.

Table 14.5: Main users of hazardous chemical products by sector

Industry	Number	%
Chemicals and paracheicals	264	66.00
Agrifood	109	27.25
Textile and leather	19	4.75
Metallurgic, mechanical and electromechanical	4	1.00
ND/other	4	1.00
Total	400	100.00

Source: Risk Prevention Plan for the Management of Hazardous Chemicals.

Photo 14.2: Salt mines

Photo credit: Toni Sirera, <https://depositphotos.com>

Also, as part of the actions initiated by the Department of Sustainable Development in the implementation of the and National Action Plan for Sound Ecological Management of Chemical Products, an application guide on the directives of good practices for rational management chemical products in the industrial environment has been developed and disseminated to players in the industrial sector. This guide aims to assist manufacturers in applying the principles of precaution, prevention and reduction of chemical pollution and the promotion of good environmental practices.

Storage and elimination

Several actions were carried out subsequent to the ratification of the Stockholm Convention on Persistent Organic Pollutants in 2004, such as the disposal of DDT stockpiles (50 tons) through the Quick Start Programme in the framework of the Strategic Approach to International Chemicals Management

(SAICM), the implementation of the disposal project for obsolete pesticides and the strengthening of life-cycle management of pesticides in Morocco.

Furthermore, the management and ecologically well-planned disposal of PCBs is one of the priorities in the National Implementation Plan (NIP) under the Stockholm Convention. The Phase 1 of the NIP allowed:

- The institutionalization of the Commission on PCBs whose mission is to ensure compliance with and implementation of the clauses of the Stockholm Convention;
- The realization of an inventory and a campaign to analyse 6,000 transformers likely to be contaminated with PCBs;
- The installation, in 2015, of the first platform in Africa and the Arab countries for treating and rehabilitating electrical appliances that contain PCBs;

- The treatment and disposal of 1,530 tons of equipment, amounting to 37 per cent of the quantity in the national inventory.

Phase 2 of the NIP, entitled “Making the Management and Disposal of Polychlorinated Biphenyls (PCBs) Sustainable in Morocco”, and implemented together with the United Nations Industrial Development Organization (UNIDO), aims to continue the disposal and treatment of equipment contaminated with PCBs, strengthen the regulations on PCBs management, and promote best available techniques and best environmental practices for the rational management of equipment and oils containing PCBs for the benefit of holders and the various actors concerned.

Furthermore, a project to establish a national hazardous waste disposal centre is under development by the Department of Sustainable Development.

In the framework of the Montreal Protocol on Substances that Deplete the Ozone Layer, which Morocco ratified in 1995, several actions were carried out on eliminating substances that deplete the ozone layer, such as CFCs and HCFCs. The Plan for HCFC Disposal Management was started in 2011. In Phase I, which was completed in 2020, Morocco reduced HCFC consumption levels and profited from major technology and transfer of know-how in the field of industrial refrigeration. Currently, the ministry in charge of industry, in cooperation with UNIDO, is implementing the action plan for Phase II until 2025.

In 2018, Morocco approved the Kigali Amendment to the Montreal Protocol through the adoption of Dahir No. 1-18-75. This amendment, which is aimed at incorporating HFCs, has been ratified in 2022.

Surveys on mercury carried out under the Minamata Convention have shown that none of the stocks of mercury or its compounds or sources of supply in Morocco have the characteristics specified in subparagraph (a) of article 1 of that Convention. However, smaller stockpiles and sources of supply do exist, such as, for example, silver mineralization recovery at the Société Métallurgique d’Imiter and the mercury stocks at the Procurement Division of the Ministry of Health and Social Welfare. In addition, potentially contaminated sites, such as landfills, chlor-alkali production sites, residue from non-ferrous metal mining and sediment dredging sites, have been identified and need to be analysed to confirm or refute their contamination.

14.3 Environmental pressures by industry

Morocco does not have a quantitative inventory of air emissions, liquid effluents and solid waste, nor of soil and ecosystem pollution, as is needed to assess environmental pressures from industry and mining.

ONEDD, through its Environmental Database Service, is responsible for collecting, processing and disseminating environmental data. However, its database does not include information on industrial emissions, effluents and waste. Thus, Recommendation 11.1 of first EPR on the adoption of a decree to create an effective mechanism for collecting and validating data on industrial pressure on the environment has been only partially implemented.

Air

Industry contributes to air pollution by consuming energy, either directly from fuel oil, petroleum, etc. or indirectly through processing. The main pollutants released into the atmosphere are sulphur dioxide (SO₂), carbon dioxide (CO₂), carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and particulate matter (PM).

Atmospheric emissions generated by processing industries contribute largely to the degradation of air quality, especially near highly industrialized areas such as Casablanca, Mohammedia, Safi and Jorf Lasfar, and in areas with large energy-intensive industries. These atmospheric emissions are harmful to both the environment and human health. The amounts of emissions produced depend on the fuel used, the nature of the combustion equipment and the operating conditions of the equipment.

Although Morocco has a national air quality monitoring system in place, there are too few stations, even in the most industrialized part of the country (there are only four in Marrakesh and one in Settat), to effectively monitor air quality and to keep the public, local authorities and decision-makers informed. The cement, phosphoric acid and fertilizer industries are among the largest polluters in Morocco because of the significant amounts of fluorinated gas emissions and fine particles involved in processing. However, suspended particulate matter with a diameter under 2.5 µm (PM_{2.5}), which is considered the most dangerous for human health, is not monitored.⁴³⁸

In the heavily industrialized Greater Casablanca region, the health protection limit values for SO₂ (125

⁴³⁸ World Bank, Report on the Cost of Environmental Degradation in Morocco (2014).

$\mu\text{g}/\text{m}^3$), NO_2 ($50 \mu\text{g}/\text{m}^3$), O_3 ($110 \mu\text{g}/\text{m}^3$) and PM_{10} ($50 \mu\text{g}/\text{m}^3$), are generally exceeded.⁴³⁹

The obligation of industry to self-monitor air pollution and report the related information to the relevant authorities is pending. In addition, most industrial units do not have adequate equipment, such as regulatory boilers and stacks, self-monitoring devices and sampling platforms, to effectively monitor the pollutants they release into the atmosphere. Under the present conditions, it is difficult for the authorities to monitor and control industrial air emissions. In order to improve this situation, the Department of Sustainable Development is developing specific emission limit values (SELVs) for certain sectors of industry, such as iron and steel, ceramics, oil refineries and brickworks. Thereupon the Department, working together with industrial associations and federations, expects to conclude agreements with each branch of industry. At present, cement is the only branch of industry that has an agreement signed with the Department and, by virtue of this agreement, measures emissions and reports its observations regularly.

Surface waters

Water use by industry increased by 1.6 per cent, from 51,355 million m^3 in 2014 to 66,235 million m^3 in 2015, according to the HCP.

More than 98 per cent of industrial wastewater is discharged into the sea, according to the 2015 Third National Report on the State of the Environment. The Moroccan coastal regions (Casablanca–Mohammedia, Tangier, Safi and Nador) suffer most from liquid industrial discharges, such as cooling water, water for washing raw materials and manufacturing process effluents, which are discharged either directly into the sea or indirectly via waterways.

Industrial wastewater is generally discharged into the natural environment near the production site. Most wastewater is composed of organic compounds, suspended solids, nutrients and heavy metals. These industrial discharges cause a rise in the water temperature and a change in pH, turbidity and oxygen consumption, in addition to the inhibiting and toxic effect of organic and metallic micropollutants.

The chemicals and paracheicals industries, especially phosphate processing plants, are the major

source of liquid discharges from the processing industries (931 million m^3 , of which 22.7 million m^3 are from activities unrelated to phosphates). Liquid discharges from enterprises in other sectors (textile and leather, agrifood, paper/cardboard, and metallurgic, mechanical and electromechanical industries) amount to 57.7 million m^3 in total. Mining is also responsible for significant water pollution through acid mine drainage and wastewater containing suspended solids, chemical substances and heavy metals that are generated during ore extraction and processing. Further, industrial solid waste is discharged into uncontrolled dumps, often located near waterways, or directly onto the land, thereby decreasing the quality of the surface water.

In compliance with the 2020 VNR, the proportion of wastewater flows safely treated (SDG indicator 6.3.1) increased from 25 per cent in 2016 to 55 per cent in 2019, which showed that the Government's effort to lessen water pollution was beginning to show positive results. In 2017, 70 per cent of the water bodies had good quality ambient water. Water-use efficiency (SDG indicator 6.4.1) was "medium", although it improved slightly since 2012, from US\$7.06 to US\$8.42 per m^3 in 2019.⁴⁴⁰ Further, the level of water stress (withdrawal of freshwater as a proportion of the total available freshwater, SDG indicator 6.4.2) remained stable; around 50.8 per cent between 2012 and 2017.

Since reliable, current data on the quantities of effluents produced by industry are unavailable, changes in liquid discharges are assumed to parallel changes in industrial production, the theory being that the volume of these effluents evolves in line with the volume of production. Viewed from this standpoint, industrial activities will continue to do damage to the quality of water resources unless industry makes up for its tardiness in liquid and solid sanitation and in the purification of industrial wastewaters. Another issue concerns the lack of specific discharge limit values (SDLVs) for industrial branches. Although certain polluting sectors, such as the paper and sugar industries, already have SDLVs, others do not. The general discharge limit values (GDLVs) were adopted in 2013 in the form of Joint Ministerial Order No. 2942-13 and amended in 2018 by Joint Ministerial Order No. 3286-17.

⁴³⁹ Air quality evaluation carried out in 2013 (DMN 2014), State of the Environment, Greater Casablanca Region (2014).

⁴⁴⁰ FAO.

Box 14.1 Developments in the treatment of liquid discharges by the Compagnie Électrochimique Marocaine

Between 2005 and 2017, the chlor-alkali unit of the Compagnia Electroquimica Marroqui (COELMA) implemented an action plan for the management and treatment of its effluents. The main actions were:

- In 2005, the first phase of the wastewater treatment plant (WWTP) was installed to treat liquid effluents through the decantation process; the mercury level in the final discharge was between 50 and 70 µg/l;
- In 2011, the treatment of liquid effluents was improved through the use of filtration (a filtering press); the mercury level in the final discharge was under 50 µg/l;
- In 2012, the sewerage system was installed and the discharge of treated industrial effluents into the Martil *wadi* was permanently ended;
- In 2017, a second improvement was made through the introduction of a treatment to separate liquid effluents, thanks to which the level of mercury in the final effluent discharge was under 20 µg/l.

Furthermore, COELMA neutralizes the pH in the effluent and eliminates the suspended matter before discharging it into the municipal sewer system. Notably, a large part, more than 60 per cent, of the treated effluents is recycled, since the company sends the recycled condensates from hydrogen and chlorine cooling and the brine treatment filtrate to the brine circuit and the sodium hydroxide (caustic soda) production unit.

Source: Third National Report on the State of the Environment in Morocco, 2015.

Soil and groundwater

Industrial activities often cause soil pollution and, hence, pollution of the groundwater. There are several reasons for this, such as leaks in a fuel tank or pipeline, the discharge of industrial wastewater directly into the soil, toxic leachate from industrial and mining waste, and inappropriately stored chemicals that are exposed to risks in the event of flooding or improper handling during production and/or transportation. Soil pollution from industrial activities can often be traced to heavy metals, hydrocarbons, mineral oils, chemical products, etc.

By 2015, industrial waste, with an annual production level of 5.4 million tons, had become a major source of soil and groundwater pollution. Waste, including hazardous industrial waste, is found mainly in the Greater Casablanca region and comes mostly from the chemicals and paracheicals, textile and leather, and mechanical and metallurgic sectors.

Besides waste pollution, industries cause other pressure on soils, depending on the region and the type of activity. The main sources of pressure are related to deforestation, land clearing and fertility loss due to infrastructure. Further, land used for mining and quarrying exerts heavy pressure on soil resources because of soil stripping and clearing and the removal of original vegetation. Waste from mining (slag heaps and tailings facilities), which often contains dangerous substances and heavy metals, also contributes to soil degradation, especially when the waste is abandoned without rehabilitation after mining closure. The significant quantities of mine waste that is not environmentally rehabilitated, observed in the coal

mines in the Morocco's Oriental region, illustrates this issue.

Since recent qualitative and quantitative data are not available, it has not been possible to assess soil and groundwater pollution caused by industrial activities in Morocco. At present, there is no monitoring system with regular soil sampling that provides enough measurements to analyse soil contamination and degradation.

Ecosystems

Industrialization constitutes a direct threat to the marine ecosystem, especially fisheries in Morocco's coastal zone. It has led to the discharge of both liquid and solid industrial waste that jeopardizes the marine environment. The lack of biodiversity management plans for operational phases in industrial zones and the lack of well-targeted mitigation measures is making the situation worse. The development of industrial zones has also been detrimental to the terrestrial biodiversity, especially the species and habitats located within or very close to the industrial zones.

Major efforts are being made to protect the coastline. Wastewater purification stations have been installed in several big coastal cities, such as Rabat, Casablanca and Al Hoceima, while other cities have just built outfalls that dispose of wastewater in the ocean after a preliminary treatment, such as Tétouan and Tangier. About 321.2 million m³/year, or 42.8 per cent of the total volume of the water discharged into the sea, passes through the pretreatment unit.⁴⁴¹ Nonetheless, a certain number of industrial units are still discharging their liquid effluents, which contain polluting chemical and organic matter, into the waterways and

⁴⁴¹ World Bank, Report on the Cost of Environmental Degradation in Morocco. 2014.

the sea. For example, the wastewaters that contain phosphogypsum are channelled into the Atlantic at Jorf Lasfar and Safi. Also, solid waste is carried into the sea with the wastewater and damages the marine ecosystems.⁴⁴²

Climate change

Industry and mining affect the climate, mainly due to:

- GHG emissions (from industrial processes);
- The water consumption rate and the liquid discharges, which can affect river flow rates and be a direct source of pollution for inland and marine waters;
- Deforestation and pressure of industrial infrastructure construction on the ecosystems.

Climate change can negatively impact industry and mining by jeopardizing their operating capacity and their economic viability, for instance by decreasing the availability of water resources and raw materials for certain branches of industry, such as agrifoods and forestry. Climate change may also be responsible for the increased intensity and frequency of extreme weather events that can trigger natural (and technological) disasters, which have serious economic and environmental consequences. There is also the risk of logistical disruptions, such as delays in deliveries, penalties for delays and supply chain issues such as the shortage of raw materials.

In 2018, the industrial processing sector accounted for 6.23 per cent of the GHG emissions.⁴⁴³ Between 2004

and 2018, this figure dropped by just 0.9 per cent for CO₂, mainly because of the lower cement production (table 8.1). Most (99 per cent) of the gas emissions were CO₂. HFC emissions accounted for between 0.15 and 1.9 per cent of the emissions in the period 2004–2018, but rose elevenfold during this period. The CO₂ emission per unit of manufacturing value added (SDG indicator 9.4.1) gradually declined, from 0.65 kg CO₂/US\$ to 0.39 kg CO₂/US\$ (constant 2010⁴⁴⁴) between 2012 and 2017, probably because of the lower cement production level.

The Moroccan industrial sector is energy intensive. The highest consumption level is in the cement and building materials sector, followed by agrifoods, chemicals and paracheicals, and textiles.⁴⁴⁵ The mining and metals processing sector is also a high energy consumer. Implementation of the Paris Agreement should enable the Moroccan economy to adopt renewable energies and increase its energy efficiency faster.

With this in mind, some industries have started calculating their carbon footprint and have drawn up action plans and strategies to reduce their CO₂ emissions. For example, the OCP carbon footprint in the period 2010–2015 was around 3 million tons of CO₂-eq. Similarly, Lydec, the company in charge of potable water, sanitation, electricity and public lighting in Greater Casablanca, assessed its first carbon footprint for the year 2015 and drew up an action plan to lower its emissions rate. However, Morocco does not have yet a legal basis on which to calculate the carbon footprint of industry.

Box 14.2: The GHG10 index tool

The Mohammed VI Foundation for Environmental Protection, with support from the French Environment and Energy Management Agency, created a tool called Bilan GES10 (GHG10 index). This is a Moroccan adaptation of the French Agency's tool called Bilan Carbone® and complies with ISO standard 14069. The emission levels proposed in this tool are based on international databases and publications (IPCC Base Carbone®).

Certain emission factors were studied in greater detail to include country-specific data that were then submitted to the Agency for validation and inclusion in the Base Carbone®. The tool uses an updated carbon database comprising more than 300 emission levels, of which 150 are specific to Morocco. It allows the Foundation to work with organizations (administrations, territorial units and enterprises) on managing their GHG emissions, and provides a complete, integrated approach, free of charge, that enables these companies to calculate their carbon footprint and carry out carbon-reduction operations and, in some cases, provide voluntary compensation. Morocco is currently updating the GES10 index tool.

Up until now, the following Moroccan companies, among others, have used the Foundation's tools to calculate their GHG emissions: Casablanca University Hospital (Hæmodialysis Centre), Cosumar, Les Eaux minérales d'Oulmès, Lydec, Société Orobrique (Brickworks), Société d'Aménagement et de Promotion de la Station de Taghazout, SNTL and Souriau Maroc (Aeronautical connectivity).

Source: UNIDO <https://stat.unido.org>; IEA (2019), CO₂ Emissions from Fuel Combustion; www.iea.org/statistics.

⁴⁴² Ibid.

⁴⁴³ UNFCCC, Second Biennial Update Report. 2019.

⁴⁴⁴ UNIDO MVA 2020.

⁴⁴⁵ Ibid.

Photo 14.3: Ain Beni Mathar thermo-solar power plant, Oriental region

Photo credit: Department of Sustainable Development

Health

Several scientific studies indicate that outdoor air pollution has a significant effect on people's health. The 2015 Third National Report on the State of the Environment, for instance, refers to the considerable correlation between bronchial syndromes and PM and SO₂ emissions in the Safi region.

Furthermore, in 2015 the then Ministry of Health and the Mohammed VI Foundation for Environmental Protection carried out an eco-epidemiological study entitled "Air Quality and Health in the Greater Casablanca Region" to assess the effects of atmospheric pollution on the health of inhabitants, with the aim of installing an eco-epidemiological monitoring mechanism. The study showed a significant correlation between the results observed in both adults and children and the concentration of pollutants (O₃, NO₂, PM₁₀, SO₂) throughout the region.

According to a 2014 World Bank study,⁴⁴⁶ the total estimated cost of air pollution is 9.7 million dirhams or 1.05 per cent of GDP. Most of the cost, by far (75 per cent), comes from deaths connected to outdoor air pollution, especially in Casablanca, Marrakesh and

Tangier, because of ischemic heart disease, stroke and lung cancer in adults.

In addition, the chemical composition and the volume of hazardous industrial waste has undeniable effects on human health, ranging from poisoning or asphyxiation (by some gases) to chronic diseases (asthma and hypersensitivity) or carcinogenesis (PCBs and asbestos). POPs also affect human health because of their capacity to remain dormant for exceptionally long periods of time, enter the food chain and accumulate in the fatty tissue of living organisms.⁴⁴⁷

The mortality rate attributable to unintentional poisoning (SDG indicator 3.9.3) is not high in Morocco and has decreased between 2010 and 2016, from 0.7 to 0.6 deaths per 10,000 population.

Certain diseases in human beings may be caused by industrial wastewaters that are discharged into the environment without sufficient prior effective treatment.

⁴⁴⁶ World Bank, Report on the Evaluation of the Cost of Environmental Degradation in Morocco. 2014.

⁴⁴⁷ World Health Organization, Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2016, Geneva. 2018.

14.4 Legal, political and institutional framework

Legal framework

Hazardous industrial facilities

In Dahir No. 97 of 25 August 1914 concerning unhealthy, inconvenient or dangerous industrial facilities, facilities are divided into three classes, depending on the nature of their activity and their “inconveniences” or negative health and safety impacts. The opening of a Class 1 or 2 establishment requires a permit from the “authorizing body” (*régime de l’autorisation*) while a Class 3 establishment must simply be declared to the appropriate authority (*régime de déclaration*). However, the Dahir does not include any specific legal requirements concerning environmental protection, pollution risk management adapted to the current economic situation, and prevention, preparedness and response to major industrial accidents.

The list of industrial units subject to this Dahir was set out in a 1933 Order by the Prime Minister. It has remained essentially unchanged, despite several updates. The list is very outdated and does not correspond to present-day industrial production methods and technologies.

As the 2014 Dahir is still being revised, Recommendation 11.2 of the first EPR, which called for its revision to include the categorization of activities based on the environmental pressure principle for the authorization of industrial activities, is considered to be only partially implemented.

The mining sector

The new Law on Mines (No. 33-13 of July 2015) provided the national mining industry with a more modern legal framework, drawing on international practices. However, its provisions concerning the sustainable development of the sector and the protection of the environment are largely inadequate. For example, the Law states that an EIA must be carried out to obtain an exploitation licence but does not stipulate that the EIA must be validated (granting of the “environmental acceptability”) before operations may be started. Further, the obligation to carry out an EIA or produce an environmental impact statement (EIS) does not apply to the granting of exploration permits, despite the considerable impact of these activities on the environment. In addition, the Law on Mines does not mention the requirements for closing and rehabilitating a mine site (mine closure and environmental and social rehabilitation plan). No

mention is made, either, of the creation of a financial fund to guarantee proper rehabilitation of a mine. As at 15 October 2021, the Law on Mines is under revision.

In 2015, the Law on Quarries (No. 27-13) was adopted in order to improve the management of quarry operations. The Law calls for an EIA to be carried out for a quarry exploitation notification.

The legislation and regulations on natural resources management, environmental protection and sustainable development that apply to industrial activities include several legal instruments, such as Law No. 11-03 on the Protection and Conservation of the Environment and Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development.

The environmental sector

The provisions of the 2003 Law No. 13-03 on Combating Air Pollution apply to stationary sources and mobile sources. They include a ban on emitting, depositing, releasing and discharging into the air pollutants that exceed standards set by regulation. But the Law does not provide for permits for emissions into the air from stationary sources. Besides the GELVs established in 2010, some industries, such as iron and steel, and brickmaking, are establishing sector SELVs, pursuant to Decree No. 2-09-631, which establishes the limit values for the emission of pollutants into the air from stationary sources of pollution and the related control procedures. To date, the cement and ceramics industries have adopted SELVs.

Law No. 36-15 on Water was promulgated by Dahir No. 1-16-113 of 10 August 2016 and six texts to enforce it have already been adopted. Effluent discharges from industry require prior authorization. In application of the former Law on Water (No. 10-95) and its implementing by-laws, which will remain in force until the publication of other regulations stemming from the new Law, several standards have been adopted and published, either to define water quality or to impose GDLVs. In addition, some SDLVs for the cement, textile, ceramics and paint industries have been adopted through the implementing orders of Decree No. 2-04-553 of 24 January 2005 relating to spills, run-off, discharges, and direct and indirect deposits into surface water or groundwater. Several SDLVs are still being prepared or discussed with the business community, but this process is proving to be slow. The absence of an implementation strategy makes the process for covering all industrial sectors even lengthier.

Law No. 28-00 on Waste Management and Disposal makes a distinction between non-hazardous industrial waste that can be disposed of in landfills that receive household waste, and hazardous industrial waste that must be disposed of and treated for elimination or recycling in special facilities selected and authorized by the Government in compliance with the national master plan on the management of hazardous waste. The collection, recycling and disposal of the latter require prior authorization. Currently, this Law is under revision in order to integrate, among other matters, the concept of producer's expanded responsibility.

Dahir No. 1-69-170 on soil protection and rehabilitation, of 25 July 1969, sets out soil protection measures. Subsequent to a recommendation from the National Council for the Environment in 2009, a draft law was prepared on updating soil protection measures to fill a gap in the soil protection provisions, which omitted protection against all types of degradation and pollution. This draft law integrates the principles and objectives of Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development. It has not yet been adopted.

There are other environment-related legal instruments that apply to the industrial and mining sectors, such as Law No. 12-03 on EIA, Law No. 49-17 on Environmental Assessment, Law No. 31-13 on the Right of Access to Information and Law No. 47-09 on Energy Efficiency with its 2019 Decree No. 2-17-746 on mandatory energy audits and audit bodies. In addition, Law No. 81-12 on the Coastal Zone, and the legislation relating to the import and use of plastic bags (Law No. 77-15 and Law No. 57-18), can be applied to these sectors.

Chemical products

With regard to the management of hazardous chemical products, the first basic text governing chemical products and pesticides is the Dahir of 2 December 1922 on "governing the import of, trade in, possession and use of poisonous substances". These substances have been classified in three categories depending on their level of toxicity: A for toxic products, B for narcotic drugs and C for hazardous products. Moreover, Law No. 11-03 on the Protection and Conservation of the Environment imposes an authorization for the circulation of all harmful and dangerous substances, in addition to the monitoring and control of their use by the administration. Law No. 28-00 on Waste Management and Disposal sets out the basic principles and rules for the management of harmful and dangerous substances at all stages, from collection to transport, disposal and treatment,

while Law No. 30-05 on road transportation of dangerous goods, of 2 June 2011, foresees related measures.

There are many laws and regulations on the management of chemical products, but no specific law that comprises the basic rules needed for the classification, packaging and labelling of chemical products, or product registration, evaluation, authorization and restrictions. Within the framework of the EU-Morocco twinning project, a draft law on the registration of chemical substances has been drawn up. There is no law that encompasses the directives on the technological risk management needed for the prevention of industrial accidents and on compensation for damages.

Political framework

After the 2004–2014 National Pact for Industrial Emergence was finalized, the Industrial Acceleration Plan 2014–2020 was drawn up as part of the Government's industrial development policy. It created 54 "industrial ecosystems" covering several sectors, such as automotive, aerospace, electronics and electrical, textiles and leather, chemicals and paracheicals, pharmaceuticals, agribusiness, renewable energy, mechanical and metallurgic industries and offshoring. Furthermore, to ensure that the Plan effectively incorporated sustainable development as a lever to make the industrial sector more competitive, a green ecosystem was created with a focus on the development of waste recycling and recovery for industrial purposes and as energy. The various sectors, through performance contracts, assigned themselves precise goals connected to jobs, sales and exports. Investment projects that took shape under the Acceleration Plan led to the creation of 405,000 jobs between 2014 and 2018; women held 49 per cent of the jobs.

The Industrial Recovery Plan, recently launched following COVID-19, covers the period 2021–2023. It aims to support industrial sectors by improving their integration, increasing job creation and value, developing industrial entrepreneurship and encouraging strategic international partnership. Another objective is to decarbonize industrial production to make Moroccan industry more competitive, innovative and focused on using renewable energy. As part of the Plan, the Tatwir Green Growth Programme, implemented by the National Agency for the Promotion of SMEs (MarocPME), was adopted in January 2021. Its aim is to support very small, small and medium-sized industrial enterprises in their efforts to develop low-

carbon products, support the emergence of new green industrial sectors and reduce industrial pollution.

The National Programme for the Prevention of Industrial Pollution aimed to develop action plans on preventing and combating industrial pollution and advising industrial companies on their depollution projects. It was supported by the Fund for Industrial Depollution (FODEP) and developed under Moroccan–German cooperation, which funded projects up to 20 per cent to 40 per cent. FODEP has been inactive since 2018. Thus, Recommendation 11.5 (a) of the first EPR, which called for the identification and implementation of solutions that would ensure funding of the programme if international donors withdrew, has not been implemented. However, Recommendation 11.5 (b) of the first EPR, suggesting continuing to improve cooperation with industry associations to accelerate the transition to a sustainable industry is being implemented.

In parallel, the European Union-funded Voluntary Mechanism for Industrial Pollution Control (MVDIH) was established in 2011. The MVDIH provides ABHs with funds to subsidize between 20 per cent and 40 per cent of the cost of pollution control projects, especially the construction of industrial WWTPs. The mechanism has been extended to 2022. The FNEDD has also financed several projects, including the acquisition of kilns for artisan potters, the establishment of basins for the evaporation of vegetable waters.

Several plans and studies devoted to depollution, especially of water, are in the preparation or adoption stage, namely, the National Plan to Control Water Pollution from Mining by the year 2040, National Plan to Control Water Pollution from Industry, National Plan to Fight Water Pollution in the Olive Industry and the new Pollution Prevention and Control Programme for 2030. This programme was prepared by the then Department of the Environment and is currently under validation. It will include pilot pollution control projects and serve as a roadmap for sectoral agreements.

In 2015, under the regional SwitchMed Programme and Programme “Pays Maroc”, Morocco committed to a green, low-carbon economy by adopting its National Framework Plan for Sustainable Consumption and Production. During the same period, measures on the transition towards a green and inclusive economy were incorporated into the SNDD. Also, in 2019, the National Climate Plan for the period to 2030 was prepared to strengthen resilience to climate change and promote a rapid transition to a low-carbon economy.

Further to the SNDD, in 2018 the SNRVD, which includes industrial waste, was adopted. At the territorial level, the SNRVD introduces circular economy practices that create green jobs by developing waste-recovery units.

With regard to the mining sector, in 2013, Morocco adopted the National Mining Sector Development Strategy 2013–2025, which focuses on growing investment in research and exploration, marketing to attract national and international investors, updating regulations and capitalizing mining resources. The Strategy does not, however, include plans to reduce the negative impacts of the sector through better social and environmental management.

In order to update this Strategy, the “Plan Maroc Mines” for the period 2021–2030 has been drawn up. It aims to develop the mining sector towards being a competitive model by 2030, working for integrated industrialization and sustainable growth. The Plan is structured around four strategic pillars: development of a network of competitive players; institutional reorganization of the sector; strengthening of the social impact and the responsible and sustainable character of the sector; and adaptation of the legislative framework for financial and fiscal resources.

The only strategic document related to chemicals management in Morocco is the 2007 Strategy and National Action Plan for Sound Ecological Management of Chemical Products.

These strategies, programmes and plans are evidence of the Government’s determination to create political conditions that promote sustainable development in the industrial sector. However, the fact that the strategies and national plans are not being taken up sufficiently at the local level is holding back their implementation and follow-up.

Institutional framework

Ministry of Industry and Trade

The Ministry is responsible for designing and implementing government policy in industry, trade, and green and digital economy. It is composed of the General Directorate for Industry and the General Directorate for Trade.

Within the General Directorate for Industry, the Sustainable Development Division is in charge of promoting and supporting industrial projects in the field of sustainable development, facilitating the transition of the industrial sector to a green and

inclusive economy, and developing and implementing strategies and programmes, as well as regulatory, normative and fiscal measures, concerning the sustainable development of the sector. This Division is also responsible for implementing the Montreal Protocol and, together with the General Trade Division, allocates annual import quotas for chlorofluorocarbons (CFCs).

Furthermore, the Ministry is responsible for certain entities such as IMANOR, Maroc PME and Moroccan Office of Industrial and Commercial Property.

Ministry of Energy Transition and Sustainable Development

Within the Ministry's Department of Sustainable Development (figure 1.3), the Directorate of Programmes and Implementation has a Programmes Division and a Pollution Prevention and Control Division, which implement and monitor the industrial depollution and hazardous chemicals management programmes. The Directorate is also the focal point for the Stockholm, Rotterdam and Minamata Conventions and SAICM. There are other directorates of the Department connected to environmental management of industry, in particular, the Directorate of Climate Change, Biodiversity and Green Economy, the Directorate of Monitoring, Environmental Assessment and Legal Affairs (including the Environmental Impact Assessment and Audit Service, Permits and Procedures Service, Environmental Police Service and Standardization Service) and ONEDD (including the Environmental Database Service). There is also the LNESE, a technical control tool of the Department that participates in the monitoring of atmospheric emissions from fixed sources (stacks of industrial units) and discharges from WWTPs and industrial effluents. However, in practice, the LNESE does not intervene often, unless requests are received from public authorities that require immediate intervention together with the Directorate of Monitoring, Environmental Assessment and Legal Affairs (through the Environmental Police Service).

The Ministry's Department of Energy and Mines is responsible for managing the mining sector. The Department works through its Directorate of Mines and Hydrocarbons to prepare and implement policies for the mining and hydrocarbons sector, which includes the management of mining waste. The Directorate of Renewable Energies and Energy Efficiency is responsible for questions relating to the energy efficiency of industry, energy audits and developing the role of renewable energy in industrial production.

Ministry of Health and Social Welfare

The Ministry of Health and Social Welfare is responsible for assessing and managing the health risks connected to certain hazardous chemical products, such as mercury and pesticides, in order to protect public health.

Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests

This Ministry regulates and controls the use of chemicals in agriculture and monitors the mercury level in the main fish species.

Ministry of Equipment and Water

The Ministry of Equipment and Water controls and monitors hazardous industrial facilities. It issues operating permits to new hazardous industrial facilities, depending on the nature of the danger they potentially pose. Further, the Ministry discharges its responsibility for water pollution control, water quality assessment, water management and water policing through its Directorate of Water Research and Planning. This system is completed by the ABHs, which issue authorizations and concessions relating to the public water domain in their field of responsibility. They are also responsible for monitoring and controlling liquid discharges from industries.

Ministry of Transport and Logistics

The Ministry, through the department in charge of transport, has established regulations pertaining to the road transport of dangerous goods and the application of the legislation on the transport of dangerous chemicals.

Ministry of the Interior

The General Directorate for Civil Protection of the Ministry of the Interior has a broad field of responsibility that covers natural and technological risks. The Directorate runs the Regional Office for the Prevention of Chemical, Biological, Radiological and Nuclear (CBRN) Risks for the countries along the African Atlantic coast as part of the European Union's CBRN Risk Mitigation Centres of Excellence initiative. This Regional Office aims to develop a joint approach to the prevention of CBRN risks, such as industrial disasters, waste transport and pandemics, the implications of which require advanced safety standards. Regional priorities include chemical risk management in classified installations, transportation of hazardous materials and chemical and biological waste management.

Other organizations

The CGEM, the leading Moroccan business network, is composed of 36 professional federations. It is consulted on many of the Government's legislation, strategies, programmes and plans and involved as a stakeholder representing the private sector. The CGEM has 17 commissions to inform members and of the national economic strategies and challenges, thereby enabling them to assess risks and opportunities. Among these commissions, the Green Economy Commission focuses on green industry and climate change, the Innovation and Industrial Development Commission deals with the use of renewable energies and industrial waste management, and the Commission for Corporate and Civic Responsibility plays a role in corporate social responsibility (CSR), gender issues and ethics.

Thus, many institutions are directly or indirectly involved in environmental management in the Moroccan industrial sector, including the chemicals sector. With this broad organizational structure, the institutions involved must make great efforts to coordinate industry's environmental management effectively, which has not always been easy since the ministries did not cooperate or share data regularly, nor did they adopt the sectoral strategies to a great extent. Furthermore, the Moroccan private sector needs to participate more actively in discussions on the government's plans, programmes and strategies concerning industry and chemicals.

The greening of industry

The commitment of the private sector

The private sector has been participating in various initiatives to contribute to environmental protection and the greening of Moroccan industry. To reflect its commitment to the fight against climate change, the CGEM consolidated its partnership with the Mohammed VI Foundation for the Protection of the Environment, through the "Pacte Qualit'Air" wherein numerous enterprises voluntarily pledged to measure

their GHG emissions and adopt action plans to reduce and offset these emissions. More than 20 enterprises have signed this agreement. The CGEM has also established a network for global professional organizations for the climate, called the Marrakesh Business Action for Climate (MBA 4 Climate). Furthermore, it is investing in capacity-building for national companies through the Moroccan Business Climate Initiative, launched in 2016.

The results of the national survey of Moroccan companies carried out by the HCP in 2019 expressed the involvement of these companies in environmental protection measures (table 14.6). Large enterprises (LEs) are more involved in environmental protection than small and medium-sized enterprises (SMEs) or very small enterprises (VSEs), which are less able to finance such activities. This commitment is not yet very strong. Only 19.4 per cent of firms are engaged in water protection activities, 15.4 per cent in waste management and 15.2 per cent in reducing polluting emissions. Only 6.6 per cent of all Moroccan companies use renewable energies, but among them are 25.9 per cent of LEs.

Corporate social responsibility

The CGEM Label for Corporate Social Responsibility provides recognition of an enterprise's commitment to and inclusion of CSR in its management strategy and daily operations. The Label is a tool that companies can use to measure their CSR commitment, make progress and make that progress known to their employees, their partners and the community. External firms and an independent awards committee engaged by the CGEM determine the award recipients.

Since the creation of the CSR Label in 2007, the CGEM has awarded 107 CSR Labels (the last was scheduled to be awarded in March 2021) to companies of all sizes and in all sectors. Currently, 31 per cent of recipients are SMEs, 40 per cent of which work in industry and 60 per cent in services. A CSR Label has to be renewed every four years.

Table 14.6: Enterprises engaged in environment protection, percentage

Enterprise category	Reduction of polluting emissions	Protection of water resources	Waste management	Use of renewable energy
VSE	11.7	14.3	11.5	3.5
SME	18.3	25.6	15.7	8.8
LE	34.3	39.7	48.6	25.9
Total	15.2	19.4	15.4	6.6

Source: HCP, National Survey of Enterprises, 2019.

Green technologies

Green technologies have become a source of innovation in Morocco thanks to the development of renewable energy. The IRESEN is developing solar thermal energy projects through agreements with scientific and industrial partners and is financing research in the field of renewable energy.

Research and development

According to the HCP, in 2019, R&D was carried out in 6 per cent of Moroccan companies, 10 per cent of which were in industry and 3 per cent in trade. Of the companies involved in R&D, 29 per cent were exporting firms, 26 per cent were LEs, and 3 per cent were VSEs.

As part of Morocco's Strategic Vision for Education 2015–2030, the Higher Council for Education, Training and Scientific Research recommended increasing R&D expenditure to reach 1 per cent of GDP in the short term, 1.5 per cent of GDP in 2025 and up to 2 per cent of GDP in 2030. The world average for research is about 1.7 per cent of GDP. The amount of mainly public expenditure allocated to scientific and technical research in Morocco was 0.73 per cent of GDP in 2010 and 0.8 per cent in 2018 (SDG indicator 9.5.1). UNESCO reported that the number of researchers in Morocco rose from 720 in 2010 to 1,074 in 2016 and to 1,800 in 2017 (SDG indicator 9.5.2).

Innovation

Innovation is key to building green industry. According to the World Intellectual Property Organization's 2021 Global Innovation Index, Morocco is ranked 77th of 132 countries. Morocco has consolidated its position as one of the most innovative countries of Africa, ranking fourth behind Mauritius (52nd), South Africa (61st) and Tunisia (71st). The proportion of medium and high-tech industry value added remained stable between 2012 and 2017, at around 27–28 per cent of total added value (SDG indicator 9.b.1).⁴⁴⁸

While there has been significant progress in terms of infrastructure and human capital, the performance of the innovation system remains limited. Efforts are not well coordinated, there is too little funding, and universities and enterprises are not collaborating enough. The SMEs lack funding for research development and usually have to self-finance their research projects. The private sector does not contribute much for research, although some private

sector initiatives have been implemented, such as OCP's 4.7 billion dirham investment in a project to create a smart city, the King Mohammed VI Green City, near the Mohammed VI University located between Casablanca and Marrakesh.

Extended producer responsibility

Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development introduced the principle of environmental responsibility and the obligation to compensate for damage done to the environment. It also introduced the concept of extended producer responsibility. In addition, Law No. 28-00 on Waste Management and Disposal is under revision in order to integrate the concept. In this framework, the Department of Sustainable Development started the PNVD in an effort to establish the circular economy at the territorial level by developing waste recovery activities that create green jobs. Besides these goals, the PNVD is also aiming to reduce the wastage of natural resources, hold the impact of industrial activities to a minimum, upscale the national industrial sector and promote green investments.

Furthermore, the 2013 Finance Law, which came into force in 2014, established an ecotax for plastics. Revenue from this ecotax is allocated to the National Environment Fund.

Voluntary agreements

According to the 2019 International Organization for Standardization (ISO) survey, Morocco has 231 ISO 4001 certifications for environmental management systems, 35 more than in the previous year. This is more than other West African countries, such as Ivory Coast (39 certificates) and Senegal (14 certificates), but far below EEC countries such as France (6,402 certificates) and Spain (1,2871 certificates).

In Morocco, the majority of ISO 14001-certified facilities are multinationals or exporting companies that need this certification. In addition, subsidies that would encourage industrial companies to introduce an ISO 14001 system, and especially SMEs that do not have the means to pay for the whole certification process, are not yet available.

Only five companies in Morocco are certified under the ISO 50001 energy management system. This number is low compared with European countries such as Germany (5,786), Italy (1,168) and France (812). However, Morocco is just starting this

⁴⁴⁸ UNIDO CIP Database 2019.

certification process and is expected to make progress in the coming years. It already has other important certifications: 45 companies are certified for ISO 45001 on occupational health and safety management systems and 1,066 companies are certified for ISO 9001 on quality management systems.

Furthermore, since 1998, Morocco, through the Federation of Chemistry and Para-chemistry, has been part of “Responsible Care”, an international initiative of the chemicals industry aimed at ensuring continuous improvement in the field of health, safety and the environment.

Reducing the risk of major industrial accidents, especially involving hazardous chemicals

Major industrial accidents have serious harmful effects on the population, the environment and the economy. Legislation on environmental protection includes the preparation of emergency plans to ensure readiness for critical situations caused by industrial accidents that can generate serious environmental pollution. It also requires hazardous installations that have authorizations to install a warning system that alerts the line authorities and the neighbouring population, provide for the evacuation of staff, and ensure availability of the means to control the causes of accidents. However, there is no law that covers prevention and management in the event of a major industrial accident. Thus, Recommendation 11.4 of the first EPR on developing a comprehensive legal basis for industrial accident prevention and preparedness has not been implemented.

Aiming to reduce the risk of industrial accidents, Morocco has carried out an action plan for the prevention and management of risks stemming from hazardous industrial installations, such as oil refineries and storage facilities for toxic products and liquefied gas, which can cause fires, explosions or toxic gas leaks. A risk prevention plan for the use of hazardous chemicals has been developed and implemented. Its main results include the preparation of:

- A national inventory of hazardous chemicals that has been compiled in a database;
- Risk prevention plans for six pilot industrial units: the OCP ammonia storage unit in the port of Safi; the ethylene storage unit belonging to the National Electrolysis and Petrochemical Company in the port of Mohammedia; the PETROM hydrocarbon storage unit in the port of Mohammedia; the pesticides storage installations belonging to the ONSSA’s Directorate of Controls and Plant

Protection in Salé; the SUNABEL sugar factory in Mechraa Bel Ksiri; and the Aicha canning plant in Meknès;

- Risk prevention plans for three pilot industrial zones: the industrial zone of the oil tanker port in Mohammedia; a small unit that is part of the industrial zone of Moghogha in Tangier; and a small unit that is part the industrial zone of Ain Sebaâ in Casablanca;
- A theme-specific map of technological risks in Morocco.

Awareness-raising, education and training for sound management of chemicals

Several national capacity-building training workshops have been held for people working in chemicals management. Further, under the international conventions dealing with chemicals to which Morocco is a party (Minamata, Rotterdam and Stockholm Conventions), actions have been taken to create awareness about the impact of certain chemicals on human health and the environment. For example, in the framework of the National Chemical Information Exchange Network, activities were carried out to strengthen the capacity of the ministerial departments concerned with the management of chemicals, more specifically in terms of access to and use of specialized sites, the creation of the Network’s website, and the organization of a one-day meeting for the partners to discuss the problems of information-sharing and prepare a roadmap for the promotion of data-sharing on chemical risks.

Participation in international agreements and processes

Morocco is a signatory to numerous international agreements and protocols on environmental protection and chemicals management related to the industrial sector (chapter 7 and annex 1). Although the Government has striven to improve transparency in mining governance, it has not yet joined the Extractive Industries Transparency Initiative (EITI).

Regarding SDG indicator 12.4.1, Morocco has consistently met its commitments and obligations by transmitting information to international conventions since 2010; with regard to the Stockholm Convention, its performance rose from 50 per cent (2010–2014) to 100 per cent (2015–2019). For the period 2015–2019, Morocco’s performance was 80 per cent for the Basel Convention, 81 per cent for the Rotterdam Convention and 100 per cent for the Montreal Protocol.⁴⁴⁹

⁴⁴⁹ Environment Live, <https://environmentlive.unep.org>.

14.5 Assessment, conclusions and recommendations

Assessment

Since the first EPR in 2012, the industrial sector has made constant progress, and the mining sector has grown steadily. This may be seen as the result of the Government's plans and strategies to revive the industrial and mining sectors. To pursue this dynamic path, Moroccan industries are striving to conform to international standards and norms, such as those on environmental management, in an effort to become more competitive and increase their exports. Moroccan industry has also adopted an innovative approach by developing low-carbon green technologies that use renewable energy. Notwithstanding all these efforts, sustainable industrial development, which includes the rational use of resources and effective management of environmental pollution, is still a major challenge.

Furthermore, Morocco has developed several strategic documents and enhanced its laws on environmental protection and sustainable development that are applicable to the industrial and mining sectors. Although progress has been made in implementing new laws and their by-laws, there are still major shortcomings that were identified in the first EPR but have not been resolved. Recommendation 11.3 of the first EPR states that industry should work faster on defining emission and discharge limit values, applying them to sectoral industrial activities based on best available technology and linking them with the categorization/authorization system. This has been only partly completed and therefore remains valid. There are only a few sectors that have developed limit values for emissions and discharges. Furthermore, the limit values are not connected to the best available techniques (BAT) nor to the classification and authorization systems. Similarly, Recommendation 11.2 on the revision of the 1914 Dahir No. 97 concerning industrial facilities has only been partially implemented; the law is still being revised, but it is not in line with modern technologies. For the collection and validation of data on pressures made by industry on the environment, Recommendation 11.1 proposed the creation of an efficient mechanism. ONEDD was then created, although data on air emissions, liquid discharges and solid waste from industry have not yet been collected and analysed.

The steady development of the industrial and mining sectors in recent years has generated environmental impacts that must be added to pressure stemming from urbanization, population growth and climate change. The first EPR recommended the preparation of a

comprehensive legal base for the prevention of and preparedness for industrial accidents (Recommendation 11.4), but this has not yet been done. Priority must continue to be given to controlling technological risks in order to avoid major industrial accidents and to better coordinate the responses.

Morocco's participation in several international agreements and initiatives has laid the groundwork for sound chemicals management at the national level. Many ameliorative plans and projects have been implemented, focused mainly on the inventory of hazardous chemicals and the remediation of contaminated sites. However, as yet, there is no legal and institutional framework that brings together all the key elements for chemicals management.

Regarding the mining sector, the adoption of the 2015 Law on Mines provided the national mining industry with a more modern legal framework, inspired by international practices. However, this Law does not adequately cover environmental protection and sustainable development; it lacks any obligation to conduct an EIA prior to obtaining an exploration permit and has no provisions concerning mine closure and an environmental and social rehabilitation plan for closed mines.

Conclusions and recommendations

Modernizing legislation on hazardous facilities

Dahir No. 97 of 1914 on the regulation of unsanitary, inconvenient or dangerous industrial facilities has often been revised but is no longer relevant. Most of the provisions of this law are not adapted to the technological and environmental changes that have occurred in industry since the Dahir was adopted. In certain cases, facilities may pose a threat to public health, safety and sanitation, as well as to the protection of natural resources and the environment.

Recommendation 14.1:

The Government should:

- (a) *Accelerate the process of updating the legislation on hazardous facilities, and include a list of these facilities based either on their activity or on the substances they store, use or produce;*
- (b) *Envisage a special status for facilities classified as high-risk facilities.*

Legal and institutional framework for the management of chemical products

The current legislative framework for the management of chemical products encompasses a variety of legal and regulatory provisions currently in force. Implementation requires the commitment of the various institutions involved, as well as effective coordination of activities within their special field. This is not always possible, due to lack of cooperation in sharing information and data among the different ministries or departments involved.

Recommendation 14.2:

The Government should:

- (a) *Envisage the realization of an institutional audit to identify weaknesses and strengths in the current institutional framework for the management of chemical substances with a view to improving it;*
- (b) *Finalize and have adopted a law on the management of chemical substances that brings together the rules for the classification, packaging and labelling of chemical substances, and also substance registration, evaluation, authorization and restrictions.*

Controlling industrial risks

A major technological risk can cause an accidental event on an industrial site and lead to immediate and serious consequences for employees, neighbouring populations, property and/or the environment. This makes it essential to control industrial risks, which includes the installation of tools that can prevent the occurrence and consequences of an industrial accident, as well as response measures (coordination of rescue) and compensation for damage. Morocco's current legal framework does not include legislation that pools the current tools relating to industrial risk management.

Recommendation 14.3:

The Government should draw up and have adopted a law on industrial risk management designed to reduce risks and limit damage in the event of a major industrial accident, which should include the requirement to conduct a risk assessment for all industrial projects presenting high-risk hazards.

Recommendation 14.4:

The Government should ensure that:

- (a) *Tools are available to allow operators to control risks at source, organize emergency*

resources and ensure that relevant information is made public;

- (b) *The authority in charge of analysing industrial risk develops a database to record all events and to use this to learn from incidents and accidents that occur and inform the public about them.*

Accelerating the greening of industry and promoting environmental certification

The industrial sector is counting on the growing use of green technologies through the continuous development of renewable energies and energy efficiency, but the Government has not been contributing much to R&D on the greening of industry. Meanwhile industry is participating in several initiatives to contribute to the fight against climate change. Some industries have started to carry out carbon assessment and have developed strategies and action plans to reduce their CO₂ emissions. However, Morocco does not yet have a national framework that could help industries assess their carbon footprints.

Furthermore, the majority of ISO 14001-certified facilities in Morocco are large exporting companies that can afford to pay for the certification process. Currently, there is no subsidy that would enable SMEs to install ISO 14001 environmental management systems.

Recommendation 14.5:

The Government should pursue the greening and decarbonization of industry by increased use of renewable energy and greater energy efficiency in this sector in addition to the implementation of other priority measures, such as:

- (a) *Increasing the Government's present contribution to R&D funding for green technologies;*
- (b) *Promoting the preparation of carbon footprint assessments by industries, as well as action plans to reduce their greenhouse gas emissions;*
- (c) *Raising awareness of the importance of industry adopting environmental management systems.*

Revision of mining law to strengthen environmental obligations

Legislation on the mining sector has been modernized but still does not adequately cover environmental protection and sustainable development. International requirements for the environmental management of

mining companies' operations are much stricter than those currently applied in Morocco. Furthermore, Morocco has not yet joined the Extractive Industries Transparency Initiative (EITI).

Recommendation 14.6:

The Government should accelerate the revision of the Law on Mines to reinforce the environmental obligations of mine operators, including the creation of a fund for the environmental and social rehabilitation of mining sites.

Recommendation 14.7:

The Government should examine the benefits of joining the Extractive Industries Transparency Initiative (EITI).

Chapter 15

ENERGY AND THE ENVIRONMENT

15.1 Trends in energy balance

Morocco's total primary energy supply (TPES) increased by 10.3 per cent in the period 2012–2018, from 18.7 million tons of oil equivalent (Mtoe) to 20.6 Mtoe (table 15.1). Morocco's TPES relies heavily (around 90 per cent) on fossil fuels, making the energy sector highly carbon intense. In 2018, TPES consisted mainly of oil (60 per cent) and coal (24 per cent).

To achieve SDG target 7.2, Morocco has a declared target of reaching over 52 per cent of installed electricity production capacity from renewable sources by 2030. To achieve this ambitious target, the International Energy Agency (IEA) estimated that Morocco will need to invest US\$30 billion, which highlights the importance of involving the private sector in financing renewables. According to the IEA, the share of renewables in total final consumption (TFC) has fluctuated. It reached 20 per cent in 2005, decreased thereafter and was 10 per cent in 2018.

In 2015, Morocco's energy sector accounted for nearly 3.1 per cent of the country's GDP and employed around 0.4 per cent of the workforce. Morocco's consumption of oil products increased from almost 10.8 million tons in 2012 to 11.8 million tons in 2018 (table 15.2).

To be able to reach SDG target 7.b, Morocco has decided to increase the share of clean energy in the electricity mix to 52 per cent by 2030. The country also intends to support scientific research in the energy sector, develop strategic international partnerships and back the industrialization of its renewable production to reach those objectives. The installed renewable electricity-generating capacity (SDG indicator 7.b.1) increased from 48 W/capita in 2012 to 89.58 W/capita in 2019.⁴⁵⁰

Morocco does not have its own fossil energy resources (hydrocarbons, coal); therefore, it is heavily dependent on imports. Imports of gas oils and fuel oils, and of coke coal and similar solid fuels, increased by 25 per cent and 27.2 per cent, respectively, from 2015 to 2018 (table 15.3). About 90 per cent of the energy supply is imported (table 15.4).

The TFC of energy increased from 13 Mtoe in 2011 to 16.3 Mtoe in 2018 (table 15.5). In 2018, the transport sector consumed 37 per cent, the residential sector 24 per cent and the industrial sector 20 per cent. The TFC per capita increased by 7.1 per cent, from 0.42 toe in 2012 to 0.45 toe in 2018.

Table 15.1: Total primary energy supply, 2012–2018, ktoe

Source	2012	2013	2014	2015	2016	2017	2018
Coal	3 024.1	2 958.1	4 037.2	4 444.5	4 283.4	4 452.4	4 939.5
Crude oil	7 640.7	7 191.2	6 625.3	3 008.8	4.7	4.3	4.5
Oil products	4 899.3	5 341.7	5 145.7	8 891.5	12 014.9	12 718.8	12 392.9
Natural gas	1 067.3	1 034.8	1 006.4	1 015.7	1 032.5	1 025.1	924.2
Renewables	1 620.9	1 739.2	1 672.7	1 748.2	1 821.2	1 807.1	2 033.8
Hydro	140.2	239.5	140.8	162.1	107.9	101.9	145.6
Geothermal, solar	62.6	116.6	165.4	217.8	362.3	368.9	577.6
biofuels and waste	1 418.1	1 383.2	1 366.5	1 368.3	1 350.9	1 336.3	1 310.6
Electricity	416.3	464.3	516.8	427.6	443.2	507.0	290.2
Total	18 668.8	18 729.3	19 004.2	19 536.2	19 599.8	20 514.8	20 585.1

Source: International Energy Agency, 2020.

Table 15.2: Oil products consumption, 2012–2018, million tons

2012	2013	2014	2015	2016	2017	2018
10.8	10.8	10.2	10.5	10.9	11.6	11.8

Source: HCP, 2020.

⁴⁵⁰ Renewable electricity-generating capacity from the International Renewable Energy Agency electricity capacity database. Population data from the United Nations World Population Prospects.

Table 15.3: Imports of energy products and lubricants, 2013–2019, kt

	2013	2014	2015	2016	2017	2018	2019*
Petroleum essence	-	-	437	650	651	670	672
Gas oils and fuel oils	4 915	4 538	5 706	7 048	7 566	7 124	6 892
Petroleum gases and other hydrocarbons	3 175	3 338	3 433	3 594	3 637	3 612	3 675
Coke coal and similar solid fuels	5 716	7 938	7 814	7 951	8 338	9 964	11 422
Petroleum oils and lubricants	-	-	2 690	912	1 036	1 106	1 171
Paraffins and other petroleum products	-	-	606	434	411	362	454
Other energy products	404	490	213	-	-	-	-
Total	14 210	16 304	20 899	20 589	21 639	22 838	24 286

Source: HCP, 2020.

Note: * preliminary data.

Table 15.4: Energy balance, 2018, ktoe

Supply and consumption	Coal	Crude oil	Oil prod.	Natural gas	Hydro	Geo. solar	Biofuels & waste	Elec.	Total
Production	-	4.5	-	66.0	145.6	577.6	1 310.6	-	2 104.3
Imports	5 583.6	-	13 238.9	858.3	-	-	-	320.3	20 001.1
Exports	-	-	-	-	-	-	-	-30.1	-30.1
Intl. marine bunkers	-	-	-133.5	-	-	-	-	-	-133.5
Intl. aviation bunkers	-	-	-780.8	-	-	-	-	-	-780.8
Stock changes	-644.2	-	68.3	-	-	-	-	-	-575.9
TES	4 939.5	4.5	12 392.9	924.2	145.6	577.6	1 310.6	290.2	20 585.1
Transfer	-	-	-	-	-	-	-	-	-
Statistical differences	-0.8	-4.5	32.1	-2.9	-	-	-	0.0	23.8
Electricity plants	-4 918.9	-	-301.3	-855.4	-145.6	-577.6	-	2 943.4	-3 855.3
Other transformation	-	-	-	-	-	-	-33.4	-	-33.4
Energy industry own use	-	-	-	-	-	-	-	-14.0	-14.0
Losses	-	-	-	-	-	-	-	-529.6	-529.6
TFC	19.8	-	12 123.6	66.0	-	-	1 277.3	2 802.0	16 288.6
Industry	19.8	-	2 081.2	66.0	-	-	104.6	1 039.2	3 310.8
Iron and steel	-	-	-	-	-	-	-	-	-
Chemical and petrochemical	-	-	65.6	-	-	-	8.6	95.3	169.5
Non-ferrous metals	2.0	-	70.6	-	-	-	0.0	122.9	195.5
Non-metallic minerals	-	-	1 177.8	27.1	-	-	89.7	201.6	1 496.2
Transport equipment	-	-	4.6	-	-	-	-	17.3	21.9
Machinery	-	-	1.0	-	-	-	-	55.2	56.2
Mining and quarrying	-	-	391.2	20.1	-	-	-	247.7	659.0
Food and tobacco	17.8	-	208.9	-	-	-	4.4	153.1	384.2
Paper, pulp and printing	-	-	25.2	18.7	-	-	-	27.0	70.8
Wood and wood products	-	-	0.4	-	-	-	0.2	2.9	3.5
Construction	-	-	59.6	-	-	-	0.7	26.2	86.5
Textile and leather	-	-	53.4	-	-	-	1.0	70.0	124.5
Non-specified	-	-	22.9	-	-	-	-	20.1	43.0
Transport	-	-	5 936.1	-	-	-	-	32.2	5 968.3
Domestic aviation	-	-	28.8	-	-	-	-	-	28.8
Road	-	-	5 897.7	-	-	-	-	-	5 897.7
Rail	-	-	9.7	-	-	-	-	32.2	41.9
Other	-	-	3 665.9	-	-	-	1 172.7	1 730.5	6 569.1
Residential	-	-	2 578.8	-	-	-	514.4	956.1	4 049.3
Comm. and public services	-	-	152.9	-	-	-	658.3	485.0	1 296.1
Agriculture/forestry	-	-	934.2	-	-	-	-	289.4	1 223.7
Non-energy use	-	-	440.4	-	-	-	-	-	440.4

Source: IEA, 2020.

Table 15.5: Total final consumption, 2011–2018, ktoe

	2011	2012	2013	2014	2015	2016	2017	2018
Total	13 066.8	14 252.9	14 563.1	14 537.8	14 537.8	15 368.2	16 089.4	16 288.6
Industry	3 097.8	3 355.5	3 313.1	3 076.7	3 076.7	2 938.0	3 312.7	3 310.8
Transport	4 712.0	4 782.1	4 969.6	5 034.1	5 034.1	5 582.6	5 775.7	5 968.3
Other	5 257.1	5 717.5	5 826.8	6 014.6	6 014.6	6 350.6	6 517.7	6 569.1
Residential	2 490.9	3 539.0	3 590.3	3 726.6	3 726.6	3 921.5	4 007.9	4 049.3
Comm. and public services	485.0							
Agriculture/forestry	1 680.0	1 189.6	1 199.9	1 220.5	1 220.5	1 237.2	1 287.1	1 296.1
Non-specified	44.2	988.9	1 036.6	1 067.5	1 067.5	1 191.9	1 222.7	1 223.7
Non-energy use	556.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		397.9	453.5	412.5	412.5	497.1	483.3	440.4

Source: IEA, 2020.

According to the HCP, the total installed power increased from 7,328 MW in 2013 to 11,410 MW in 2018 (table 15.6). In 2019, the total installed capacity of electricity generation of the ONEE was estimated at 10,677 MW, of which 34.6 per cent of installed capacity was from renewable sources. In 2019, the electricity generated reached 40,348.2 GWh (table 15.7). Electricity consumption has grown by 6.5 per cent on average in the period 2011–2018, mainly due to the advancements in rural electrification, the progress of the national economy and population growth (road infrastructure, tourism, agricultural centres, industrial platforms). Electricity demand from 2002 to 2014 more than doubled from 16 TWh to 34 TWh.⁴⁵¹ According to the IEA, in 2018, electricity consumption was 0.92 MWh per inhabitant in Morocco, 1.5 in Tunisia, 1.6 in Egypt, while the average for Africa was 0.6.

The source of electricity in Morocco is diversified, but mainly generated by fossil fuels (coal, oil and gas). According to the IEA, in 2019, 67.3 per cent of electricity production was generated by coal, 11.7 per cent by natural gas and 11.7 per cent by wind power.

The remaining 9.2 per cent includes solar thermal, oil, solar photovoltaic (PV) and other sources. Regarding access to energy (SDG target 7.1), according to the World Bank, in 2021, 99 per cent of the population in rural areas and 100 per cent in urban areas had access to electricity (SDG indicator 7.1.1). Since 2007, the proportion of the population with primary reliance on clean fuels and technology is above 95 per cent.

In 2018, the share of the rural population having access to electricity reached 99.43 per cent, whereas it was only 48.1 per cent in 1990. At the local level, access to electricity varied from 87.7 per cent to 93.7 per cent, with access in the regions of Beni Mellal-Khenifra, Oriental, Rabat-Salé-Kenitra and Marrakesh-Safi being below the national average. In 2014, in urban areas, access to electricity varied from 93.4 per cent to 96.7 per cent, with access in the regions of Oriental (94.9 per cent), Rabat-Salé-Kenitra (93.4 per cent), Beni Mellal-Khenifra (93.5 per cent), Souss-Massa (94.7 per cent), Laâyoune-Sakia El Hamra (93.8 per cent) and Dakhla-Oued Eddahab (94.4 per cent) being below the national average (95.2 per cent).

Table 15.6: Installed power, 2013–2018, MW

	2013	2014	2015	2016	2017	2018	2019*
ONEE							
Total	6 992	7 994	8 154.8	8 261.6	8 821	10 939	10 677
Hydro	4 727	5 432	5 432	5 412	1 770	1 770	1 770
Thermal	1 770	1 770	1 770	1 770	5 851	7 237	6 976
Wind	495	792	792	898.4	1 019	1 221	1 220
Solar	-	-	160.8	180.8	181	711	711
Main self-producers							
Total	336.30	336.30	336.25	471.25	471.25	471.25	471.25
Maroc Phosphore	247.00	247.00	247.00	382.00	382.00	382.00	382.00
SAMIR	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Cellulose du Maroc	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Lafarge Tétouan	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Indusaha	5.30	5.30	5.25	5.25	5.25	5.25	5.25
Grand total	7 328.30	8 330.30	8 491.05	8 732.85	9 292.29	11 410.25	11 148.25

Source: HCP, 2020.

Note: * preliminary data.

⁴⁵¹ www.researchgate.net/publication/323890276_Renewable_Energy_Potential_and_Available_Capacity_for_Wind_and_Solar_Power_in_Morocco_Towards_2030.

Table 15.7: Electricity production, 2013–2018, million kWh

	2013	2014	2015	2016	2017	2018	2019*
Total	26 829	27 944.4	29 854.5	30 716.1	31 889.829	34 519.4	40 348.2
Thermal ¹	22 483	23 987.7	25 047.9	25 652.3	2 6854.1	27 708	32 389.6
Hydro	2 990	2 032.9	2 281.5	1 662.2	1 564.71	1 997.8	1 653.8
Wind ²	1 356	1 923.8	2 519.4	3 000.1	3 055.7	3 863.4	4 723.4
Solar	-	-	5.7	401.5	415.317	950.2	1 581.5

Source: HCP, 2020.

Note: ¹ including Jorf Lasfar ABM Tahaddart and SAFIEC; ² including Compagnie Eolienne du Détroit.

* Preliminary data.

Photo 15.1: Ouarzazate Solar Power Station, Drâa-Tafilalet region

Photo credit: Department of Sustainable Development

In 2014, in rural areas, access to electricity varied from 20 per cent in the Dakhla-Oued Eddahab region to 89.6 per cent in the Drâa-Tafilalet region, with the regions of Oriental (75.7 per cent), Fès-Meknès (84.1 per cent), Rabat-Salé-Kenitra (81.3 per cent), Beni Mellal-Khenifra (75 per cent) and Laâyoune-Sakia El Hamra (47.9 per cent) being below the national average (84.6 per cent).

The total length of the national transport network was 27,081 km in 2019. The transport network is interconnected to the Spanish and Algerian electricity networks, acting as an energy hub between the two shores of the Mediterranean.

Transportation

The Maghreb Europe Gas Pipeline (GME) connects Portugal and Spain with the Maghreb. The volume of natural gas transited through the GME in 2017 was

7.93 billion m³, 12 per cent less than the 9.01 billion m³ transited in 2016. The reduction was caused by decreased European gas demand (via Sagane and Transgas). Morocco has gas pipeline interconnections with Mauritania, Algeria and Spain. The Maghreb–Europe pipeline transports natural gas from Algeria to Europe through Morocco and the Strait of Gibraltar with a capacity of about 10 bm³/year.

Morocco has energy interconnections with some neighbouring countries (Algeria and Spain). There are ongoing feasibility studies on connection with other countries.

Oil refinery

Morocco's only refinery, Samir in Mohammedia, shut down in 2015 due to unpaid debt to the State and banks. The refinery used to have a capacity of more than 150,000 barrels a day. Since 2018, there are

ongoing political initiatives to renationalize the refinery.

Extraction of energy sources

Deposits of oil shale are in the south of Morocco. Exploiting this source with currently available technologies to produce electricity and pyrolysis is not economically viable. The two main sites of oil shale are:⁴⁵²

- Tarfaya, on the Atlantic coast, 1,200 km south of Rabat. The sequence of bituminous rock is composed of alternating dark and light levels of chalky limestone. Reserves are estimated at 80 billion tons of oil shale containing 22 billion barrels of oil;
- Timahdit, at an altitude between 1,700 m and 2,300 m, approximately 240 km south-east of Rabat. Identified reserves are of 42 billion tons of oil shale, with an average grade of 61.5 l/t, or 15 billion barrels of oil. The capacity of the pilot unit is 80 tons of oil shale per day.

Four hydrocarbon fields are located in the Essaouira basin:

- The Meskala field, the most crucial discovery of natural gas in Morocco to date, has operated since 1987; in 2015, 26 million m³ of natural gas was produced;
- The Toukimt gas condensate field, which operated from 1985 to 1998 and ceased operations due to technical problems;
- The Zelten gas condensate field, which is not developed to date because of its low hydrocarbon reserves;
- The N'Dark gas field, with gas with a low calorific value (50 per cent nitrogen), is not yet developed due to the lack of profitable opportunities.

The well stream fluids produced from Meskala and Toukimt require processing operations to separate gas and liquids (condensate and water). The Gharb Basin has small amounts of natural gas (61 million m³ in 2014; 67 million m³ in 2015).

According to the IAEA,⁴⁵³ the estimated availability of uranium in Moroccan phosphate deposits is about 6.9 million tons. The National Office of Hydrocarbons and Mines reports that uranium is present in virtually

all areas of the country, in Precambrian granite (Anti-Atlas) and Hercynian (High Western Atlas, Jebilet, Rehamna, Central Morocco, Morocco High Moulouya and the north-east). Exploration for uranium is currently concentrated in the Anti-Atlas and the southern provinces.⁴⁵⁴

Climate Action Tracker⁴⁵⁵ reports that Morocco has extended the lifetime of some of its coal plants and is building new ones:

- Jorf Lasfar coal power plant (2 GW): in 2020, ONEE extended its power purchasing agreement (PPA) from 2007 to 2044;⁴⁵⁶
- Safi coal power plant (1.4 GW): commissioned in 2018, the coal plant should supply around 25 per cent of Morocco's total electricity;
- Nador: a new coal power plant (1.3 GW) is under construction and will be operational in 2023–2024.

Morocco's first nuclear installation by CNESTEN was authorized in 2016 (by the then Ministry of Energy, Mines Water and Environment, the nuclear safety authority from 1994 to 2016) at the Centre of Nuclear Studies of Mâamora (CENM).

15.2 Environmental pressures

Environmental issues related to the passage of medium voltage (MV) and low voltage (LV) lines and the installation of lines/substations foreseen within the Programme for the Electrification of Rural Areas (PERG) primarily concern the natural environment: the proximity of trees that may be removed for the passage of lines, and land being used for the passage of lines.

The extensive use of traditional energy (firewood and charcoal) in rural areas poses a threat to forest cover and an increased risk to sustainable development. Diversification of energy sources in these contexts would address the environmental and societal challenges related to the development.

Fossil fuels

While 98.7 per cent of households in urban areas rely on gas, in rural areas, 36 per cent of households still use firewood and plant and animal residues as a source of energy for cooking. In rural areas, 65.5 per cent of

⁴⁵² www.onhym.com/en/oil-shales-in-morocco/key-deposits.html.

⁴⁵³ www-pub.iaea.org/MTCD/Publications/PDF/cnpp2018/countryprofiles/Morocco/Morocco.htm.

⁴⁵⁴ www.onhym.com/en/mining-promotion/exploration-types/energetic-substances.html.

⁴⁵⁵ <https://climateactiontracker.org/countries/morocco/>.

⁴⁵⁶ Industry Projects & Technology 2020.

women are involved in collecting, delivering and storing wood and residues.

The consumption rate of butane gas is still low because, despite state subsidies, the price is not affordable for the most impoverished families.

The burning of wood and charcoal has consequences for the environment and health: it generates emissions of more than 100 highly toxic contaminants that are very harmful to health, causing respiratory infections, chronic lung disease, lung cancer and vision problems. This risk is significant to women and children.

Renewables

A certain amount of water is required to cool the systems of solar-powered and thermodynamic thermal power plants. The Noor I power plant uses a wet cooling system. In contrast, Noor II and III plants will use different dry-cooling technology, allowing the saving of about 3.6 million m³ of water per year in the region of Ouarzazate.

The Tangier 2 and El Baida Koudia 2 wind energy subprojects are on rugged terrain. A high sensitivity to erosion characterizes the northern zone, due to its soil quality (predominantly flysch and shale) and high rainfall (700–800 mm/year). The area also has a high seismic risk and water resources (surface or ground) are limited. No assessments were carried out in these areas with regard to their importance for migratory and wild birds. Plant species that Morocco seeks to protect and conserve, such as the cork oak, can be found in certain locations in these regions.

The installation of wind farms requires land acquisition and relocation of dwellings found on the installation site, and retention of a strip of land on either side of the site to minimize disturbance due to the noise generated. Existing infrastructure (water, power lines) must also be moved as necessary. For large wind installations, there could also be visual and other disturbances.

15.3 Energy intensity and efficiency by end use

According to the IEA, TFC peaked in 2018 at 16.3 Mtoe. IEA data indicates an average TFC growth rate of 24.7 per cent from 2011 to 2018. Since 2011, the transport, residential and industrial sectors together generated 80 per cent of TFC growth, on average, which increased to 82 per cent in 2018.

Compared with 2007, energy intensity (TFC/GDP PPP) decreased by 9 per cent in 2017, to 60.5 tons of oil equivalent (toe) per US\$1 million GDP. According

to the IEA, energy intensity measured in terms of primary energy and GDP (SDG indicator 7.3.1) decreased from 0.083 toe/US\$1,000 (2010 PPP) in 2012 to 0.077 toe/US\$1,000 (2010 PPP).

Households rely mainly on butane gas (60 per cent of primary energy use) for cooking food and hot water. Even if the Government considers phasing out subsidies, subsidies will remain for butane gas to encourage more widespread consumption.

To strengthen energy efficiency in the industrial sector, the then Ministry of Energy, Mines and the Environment has promoted voluntary energy audits of 42 industrial companies within the framework of international cooperation. Capacity-building and communication actions have also been carried out to establish the culture of energy efficiency at industrial enterprises. Since 2019, periodic energy audits have been mandatory. According to the Decree No. 2-17-746 on mandatory energy audits and audit bodies, industrial companies whose total final energy consumption exceeds 1,500 toe must carry out a mandatory energy audit every five years. Companies that carry out activities covered by a certified energy management system are exempt from the obligation of the energy audit for the entire validity period of the certification. As of today, dozens of subject companies have carried out or started a mandatory energy audit, the audit reports of which have been submitted to the Ministry of Energy Transition and Sustainable Development, and several others have chosen the path of energy management system.

UNIDO and the AMEE organized a training cycle on the implementation of energy management systems in 2019, focused on implementing energy management systems in industry and addressing the ISO 50001 standard. Another technical assistance was deployed in the industrial areas of Tangier with the support of GIZ and AMEE.

15.4 Other sources of energy, especially renewables

The country's strategy is to reach over 52 per cent of installed electrical production capacity from renewable sources by 2030, of which 20 per cent would be from solar, 20 per cent from wind and 12 per cent from hydropower. The strategy aims to reduce the dependency on imported energy and cut emissions to help mitigate climate change. Morocco has significant wind potential, which is estimated at around 5,000 TWh/year. Morocco has an average global solar horizontal irradiance of 5 kWh/m²/day, while hydropower is highly dependent on precipitation levels.

The country has an important agricultural sector that can provide feedstock for biomass and biogas projects. In addition, a large share of Moroccan municipal waste consists of organic components. This biomass could in theory be used to replace fuel oil in the industrial sector. However, its potential has not yet been the subject of national strategies, although some small companies are already active in this field.

Selected projects supporting the objective to produce 52 per cent of electrical energy from renewable sources by 2030

Wind

A 300 MW wind farm was inaugurated in December 2014 in Tarfaya. The first tranche (87 MW) of the “Taza wind park project” (150 MW), which is part of a integrated wind programme of 1,000 MW is expected to be commissioned in 2022.

The Jbel Sendouq-Khalladi (“Khalladi”) wind farm project extends through three rural communes, its 40 wind turbines with a nominal unit capacity of 3 MW providing a total capacity of 120 MW. The expected net electricity generation is estimated at 296,100 MWh/year. The load factor (net capacity factor) is 28.17 per cent or 2,467.69 full load hours annually. The generated electricity will be distributed through the national electricity grid.

Solar

As at July 2021, the country already has several advanced operational solar plants and others are under construction. The environmental effect of these solar plants became clear when Morocco announced, at the fifth session of the United Nations Environment Assembly (UNEA 5.1/2021), that its solar energy production prevents the emission of nearly one million tons of CO₂-eq. per year.

In 2010, in Ouarzazate, Morocco launched its first solar energy project: the Noor solar station, divided into several phases (the first phase commissioned in 2015), for a total estimated capacity of 500 MW. The Noor Ouarzazate Solar Complex, a 580 MW power plant located 10 km north-east of Ouarzazate, is the largest concentrating solar power (CSP) plant in the world. The first phase, Noor I, included a 160 MW CSP plant, while the second phase involved the construction of the 200 MW Noor II CSP plant and the 150 MW Noor III CSP plant. Phase three included the construction of the 70 MW PV Noor IV CSP power plant. Noor I plant was commissioned in February

2016. Noor II and Noor III were commissioned in 2018. The Noor I CSP plant is expected to offset 240,000 t of CO₂ emissions a year while the Noor II and Noor III plants would offset 533,000 t of CO₂ emissions a year.

The Noor Tafilalt (120 MW) site consists of three PV plants in the Zagora, Erfoud and Missouri regions. Construction began in 2018, the Erfoud power plant was commissioned in 2020, the other solar power plants are under construction and are scheduled to be commissioned in 2022. The commissioning of the seven 200 MW Noor Atlas PV plants is planned by 2024.

Hydroelectricity

ONEE finalized the construction of the second Pumping Energy Transfer Station (STEP) with a capacity of 350 MW in the Abdelmoumen dam located about 70 km north-east of the city of Agadir. According to data from the Ministry of Equipment and Water, the dam has a water capacity of 198.4 million m³. However, the dam only contained 2.3 million m³ of water in 2020, which represents only 1.2 per cent of its total capacity.⁴⁵⁷

STEP pumping stations make electricity available during peak periods and complement the provision of electricity from renewable energies. Pumped-storage hydroelectricity allows energy from intermittent sources and other renewables, or excess electricity from other sources (such as coal or nuclear), to be stored for periods of higher demand. The reservoirs used with pumped storage are quite small compared with conventional hydroelectric dams of similar power capacity, and generating periods are often less than half a day.

Biogas recovery and electricity generation

The M'zar WWTP of the Independent Multi-service Agency of Agadir (RAMSA) captures methane emitted during wastewater treatment and uses it for electricity generation. The methane produced is reused instead of being released into the atmosphere, thus reducing CO₂ emissions.

15.5 Climate change

The PCN is the national strategic document on climate change. It has been followed by seven regional plans to date. In 2021, Morocco revised its NDC, which was initially submitted in 2016. Producing these documents support the implementation of the Paris

⁴⁵⁷ www.moroccoworldnews.com/2020/10/324306/abdelmoumen-dam-key-reservoir-drying-up-in-moroccos-souss-valley.

Agreement, SDG target 13.2 and SDG indicator 13.2.1.

Mitigation measures

The 2016 NDC set a conditional target of reducing GHG emissions by 42 per cent below BAU levels by 2030. The 2021 revised NDC sets a new global mitigation objective of 45.5 per cent reduction, of which 18.3 per cent is unconditional. Six of the 34 unconditional measures and two of the 27 conditional measures are oriented towards energy.

Mitigation measures concerning the electricity sector are estimated to result in 140,795.2 Gg reduction in CO₂-eq. (34.5 per cent of total CO₂ reduction) in the period 2020–2030 at a cost of US\$17,081.5 million (44 per cent of the total cost of mitigation measures). These measures mainly concern the expansion of solar and wind facilities, increasing the capacity of hydroelectric and combined-cycle power plants and the creation of new hydroelectric power plants.

In 2018, CO₂ emissions in Morocco represented 63,636 Gg CO₂-eq., an increase of 11 per cent on 2012 (56,655.9 CO₂-eq.).⁴⁵⁸ CO₂ emissions in Morocco are equivalent to 1.8 tons per capita (based on a population of 34,852,000 in 2018). GHG emissions per capita increased from 2,437 kg CO₂-eq. in 2012 to 2,609.4 kg CO₂-eq. in 2018. GHG emissions from the energy sector increased from 53,549.2 Gg CO₂-eq. in 2012 to 61,206.6 Gg CO₂-eq. in 2018 (table 15.8), representing 67.3 per cent of total GHG emissions.

In order to reduce its GHG emissions from the energy sector, Morocco has set the following mitigation goals:⁴⁵⁹

- Over 52 per cent of installed electricity production capacity from renewable sources by 2030;
- Reducing energy consumption by 15 per cent by 2030;

- Substantially reducing public fossil fuel subsidies;
- Substantially increasing the use of natural gas through infrastructure projects allowing liquefied natural gas imports.

The highest mitigation potential in Morocco resides in the electricity sector (67 per cent), followed by the industrial sector (14 per cent) and the waste sector (7 per cent).⁴⁶⁰

In the current NDC, the construction sector has a mitigation potential of almost 8 per cent. The energy efficiency measures included in the NDC for residential and tertiary buildings are listed in table 15.9.

Morocco is also involved in the Partnership for Market Implementation (PMI) and the World Bank's Transformative Carbon Asset Facility (TCAF), in the framework of participation in Article 6 pilot activities. The country plans to take advantage of its experience in project development and management under the UNFCCC Clean Development Mechanism (CDM).

Morocco has 13 CDM-registered projects that are related to energy. Six of these were registered after 2012 and are still in the credentialing period (table 15.10).

According to the OECD and the International Renewable Energy Agency (IRENA), the total public international financial flows, i.e., official development assistance and other official flows and the IRENA flows, is fluctuating, with a peak in 2014 of almost US\$1.5 billion at 2018 prices and exchange rates (SDG indicator 7.a.1). In 2018, these flows to Morocco reached US\$836 million at 2018 prices and exchange rates (table 15.11).

Table 15.8: GHG emissions from the energy sector, 2004–2018, Gg CO₂-eq.

	2004	2006	2008	2010	2012	2014	2016	2018
Emissions	37 839.8	41 766.2	45 070.3	47 726.2	53 549.2	54 926.9	56 720.6	61 206.6

Source: Report on the update of the GHG inventory, 2018.

⁴⁵⁸ www.environnement.gov.ma/images/Climat/7.BUR2-min.pdf.

⁴⁵⁹ [www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco per cent20First/Morocco per cent20First per cent20NDC-English.pdf](http://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Morocco%20per%20cent20First/Morocco%20per%20cent20First%20per%20cent20NDC-English.pdf).

⁴⁶⁰ www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2018-11-30_climate-change_30-2018_country-report-morocco.pdf.

Table 15.9: Energy efficiency measures in the building sector

Energy efficiency measures, construction sector	Implementation costs (US\$ million)	Cumulative emission reduction potential 2020–2030 (M teq-CO ₂)
Unconditional actions		
Energy labelling of refrigerators. Introducing an energy labelling programme for refrigerators	100	2
Energy efficiency for building envelopes. Adoption of the Thermal Construction Regulation Code in Morocco in residential and tertiary buildings.	18	2
Energy efficiency in the tourism sector. Implementation of an energy efficiency programme in the tourism sector, including: 300,000 low-energy lamps, 300,000 m ² of solar water heaters and the application of the Construction Thermal Regulation Code	86	1
Energy-efficient city. Establishing a low-carbon model city focused on effective energy, transportation and waste management actions.	165	1
Conditional actions		
National plan for the development of solar water heaters. Development of the solar thermal sector to reach 1,700,000 m ² by 2030.	945	15
Low-energy lamps programme in the residential sector. Implementation of 14,700,000 low-energy lamps in the residential sector.	18	4
Installations of photovoltaic solar panels. Implementation of a programme to promote photovoltaic solar panels connected to low voltage networks with a total capacity of 1,000 MW by 2030.	2 020	4
Energy efficiency programme in public lighting. Implementation of an energy efficiency programme in public lighting in Morocco's major cities.	310	1

Source: NDC, 2021.

Table 15.10: CDM energy-related projects under the UNFCCC in Morocco

Registration date	Title	Other parties	Estimated emissions reductions*
Dec. 2012	Wind farm extension project for Lafarge cement plant in Tétouan	France	49 848
Dec. 2012	Fuel oil to vegetable biomass switching at Lesieur Cristal Limited Corporation	Switzerland	11 061
Dec. 2012	Ouarzazate I Concentrated Solar Power Project		278 695
Dec. 2012	Heat recovery and fuel switch from natural gas to biomass residues implemented at Renault Tangier Méditerranée (RTM) plant – Melloussa, Morocco	France	10 468
Dec. 2012	Jbel Sendouq-Khalladi (“Khalladi”) wind farm project in Morocco	United Kingdom	143 960
June 2016	Biogas recovery and electricity generation from M'zar wastewater treatment plant, Morocco		44 296

Source: UNFCCC, CDM Registry.

Note: * Estimated emissions reductions in tons of CO₂-eq. per annum (as stated by the project participants).

Host party: Morocco.

Table 15.11: International financial flows to Morocco in support of clean energy research and development and renewable energy production, including in hybrid systems, 2012–2018, US\$ million at 2018 prices and exchange rates

2012	2013	2014	2015	2016	2017	2018
932.74	5.97	1 463.94	240.26	481.49	122.74	836.34

Source: OECD DAC Statistics database; IRENA Public Finance Database, 2021.

Note: Commitments by recipient country, in US\$ million at 2018 prices and exchange rates (using donor country deflators).

Impact from and adaptation to climate change in the energy and other sectors

The PCN analysed the impacts from and vulnerability to climate change in different sectors. According to the PCN, the impact of climate change on water resources is estimated to be around 25 per cent, including the

effect of droughts that have occurred in Morocco since the 1980s. The worsening water deficit is the combined effect of the decline in surface and underground water resources and the increase in demand for irrigation and drinking water. As hydroelectric energy is highly dependent on water

availability, shortages of water have a great impact on energy production from that source.

Climate projections, according to an emissions scenario for 2050, show a decrease in precipitation that could translate into a significant drop in agricultural yields in several regions and provinces of Morocco. Regarding the fisheries sector, the impact of climate change and the vulnerability of the sector will increase due to its high exposure to climatic variations and the limited economic means of those involved. Forest ecosystems are subject to the increasing aridification of the climate and accentuation of the risks of extreme phenomena (i.e., desertification). Climate change impacts are estimated to cause forest and biodiversity degradation. The impacts of climate change on ecosystems will also have impacts on the populations who depend on them by reducing their livelihoods and increasing their exposure to extreme events.

Besides water, agriculture, fishing and forestry, other sectors are heavily impacted by climate change, including housing and health. Projections for 2050 show that the housing sector will be more subject to various climatic hazards (e.g., floods, droughts). In addition, the analysis of the vulnerability of the health

sector revealed several types of risks, including the emergence of new diseases (e.g., malaria, leishmaniasis) and an increase in respiratory and diarrhoeal diseases linked to changes in the quality of water, air and food.

Adaptation is a priority for Morocco, given its high vulnerability to the impacts of climate change. The cost of implementing adaptation programmes in the most affected sectors is estimated at nearly US\$40 billion, according to the revised 2021 NDC. The sectors concerned are, in particular, water, agriculture, fishing and aquaculture, forestry, health, and habitat, as well as the most vulnerable environments and ecosystems (oases, coastlines and mountains).

Adaptation and resilience issues are addressed by the PCN. Climate risks are then taken into account in investment decisions and development planning. The priorities of the PCN are included in the National Strategic Adaptation Plan, which now constitutes a roadmap for setting up a coordinated national adaptation policy at the national and territorial levels. Moreover, sectoral adaptation objectives are included in the policies, strategies, programmes and plans of each sector.

Photo 15.2: Dam on Baht River (or Beht Wadi)



Photo credit: Department of Sustainable Development

Economic impacts from climate change on economic sectors and costs of mitigation and adaptation measures

No studies were carried out to assess the economic impacts of climate change on various economic sectors. The costs of mitigation measures were evaluated in the 2021 revised NDC as outlined above. However, the costs of adaptation measures have not been estimated to date.

15.6 Legal, policy and institutional framework

Legal framework

Law No. 13-09 on Renewable Energies, promulgated in 2010, addresses the legal framework for renewable energy and related investments. It has three declared objectives: to promote the production, marketing and export of energy from renewable sources by public or private entities. Power generation from renewable sources facilities is subject to authorization. The Law also requires an EIA to be conducted for new facilities.

Law No. 58-15, amending and supplementing Law No. 13-09, refers to the implementation of the second phase of the National Energy Strategy and the launch of the PV roadmap. Its main principles are increasing the threshold from 12 MW to 30 MW for hydropower, opening the low voltage renewable energy market and considering the point of view of the respective ABH in the authorization process. The Law currently allows producers who are generating renewable power for their own use to sell 20 per cent of their annual energy production and feed it back into the national energy grid.

Law No. 16-08, adopted on 20 October 2008, enables industrial installations to produce up to 50 KW of their own electricity from renewable energies. Law No. 54-14, promulgated on 1 July 2015, allows national electricity self-producers to join the transmission network to carry energy from production sites to consumption sites.

Decree No. 2-09-631 of 2010 sets limit values for emissions of pollutants from stationary sources, provides the procedures for air monitoring and recommends voluntary self-monitoring and annual self-reporting. Recommendation 12.1 of the first EPR urged the then Ministry of Energy, Mines, Water and Environment to revise Decree No. 2-09-631 to ensure environmental self-monitoring and self-reporting by energy operators and other operators causing significant adverse environmental impacts. As of

today, self-reporting remains voluntary. Private enterprises in Morocco are not obliged to communicate data related to their business, but government administrations, ministries and departments have the right to access their data.

Law No. 48-15 of 2016 regulates the electricity sector and the creation of the national electricity regulation authority with different attributions.

Decree No. 2-15-772 of 2015 sets the conditions and terms of access to the national medium voltage electricity grid for electricity generation facilities using renewable energy sources.

The 2014 Order of the Prime Minister No. 3086-14 provides the list of services and prices subject to regulation, and contains a list of goods, products and services, including energy.

The 2014 Decree No. 2-13-874 introduced general building regulations, setting out the rules for energy performance of buildings and establishing the National Committee on Energy Efficiency in Buildings. It defines a set of rules to be applied in the building sector to improve the thermal insulation of buildings to reduce energy consumption. It sets minimum requirements for new buildings' annual heating and cooling provisions compared to reference indoor temperatures. The regulation applies to new residential and tertiary sector buildings, except for individual housing in rural areas.

Pursuant to the provisions of Law No. 47-09 on Energy Efficiency, a draft decree on the energy impact study and the energy acceptability decision has been drawn up in order to establish an energy impact study system for urban development programme projects and building construction programme projects whose projected energy consumption reaches or exceeds the thresholds mentioned in the draft decree.

The 2019 Decree No. 2-17-746 on mandatory energy audits and audit bodies establishes a mandatory and periodic energy audit system to streamline energy use in energy-intensive enterprises and institutions.⁴⁶¹ It stipulates that the audits are mandatory for: (i) all firms from the industrial sector whose energy consumption is above 1,500 tons of oil equivalent per year; and (ii) all firms from the tourism, health, education, trade and services, and energy sectors whose energy consumption is above 500 tons of oil equivalent per year. The energy audit has to be conducted every five years. Recommendation 12.2 of the first EPR urged the then Ministry of Energy,

⁴⁶¹ www.mem.gov.ma/Lists/Lst_Textes_Reglementaires/Attachments/201/AEO-RecueilJuridique201120.pdf.

Mines, Water and the Environment, in cooperation with the relevant ministries and departments, to finalize secondary legislation (a) on sectoral air emission limit values related to energy sources, especially for combustion plants, and (b) threshold values for energy audits and energy impact assessments, as called for in Law No. 47-09. This recommendation is implemented with Decree No. 2-17-746.

There are also some important laws under preparation:

- Draft law No. 40-19 amending Law No. 13-09, which aims to resolve the difficulties met by independent power producers and promote the development of a national industry for renewable energy;
- Draft law relating to self-generation of electricity, which sets out a comprehensive legal and regulatory framework for self-generation projects.

Policy framework

The 2009 National Energy Strategy defined a roadmap aimed at supporting the transition to a low-carbon energy system, intending to reduce the dependency on energy imports from 93.3 per cent in 2016 to less than 82 per cent in 2030 by reducing energy consumption by 15 per cent and significantly increasing the share of renewables by 2030. It covers the areas of the electricity sector, renewable energy, energy efficiency, the fuel sector, electronuclear energy, oil exploration, oil shale and bioenergy. The objective is to guarantee energy security and diversify national energy sources by moving to alternative energies and to ensure their rational use.

The Strategy has set the following targets:

- 42 per cent of electricity from renewable sources by 2020, including 2,000 MW from solar energy, 2,000 MW from wind and 2,000 from hydropower; and over 52 per cent by 2030;
- Energy savings of 12 per cent by 2020 and 15 per cent by 2030 compared to trends;
- 2.5 million toe of fossil energy saved;
- 9.5 million tons of CO₂-eq. of avoided emissions;
- Generate more than 13,000 jobs in Morocco.

It translates into the implementation of short-, medium- and long-term action plans such as: the Moroccan Solar Plan (Noor); the 400 MW Photovoltaic Development Plan; the Integrated Wind Programme; the Hydropower Plant for Electricity

Production; the Programme for Energy Efficiency in Buildings (PEEB); the National Energy Renovation Programme for State-owned Buildings; and the energy efficiency programme in industry. Once implemented they would contribute to the achievement of the SDG target 7.1.

Noor aims to develop five solar complexes with a combined capacity of approximately 2 GW to reduce the reliance on imports for the country's energy demand. The EIB funding covers up to 60 per cent of its value. The ADB financed PERG 5 (2011–2013) in 25 provinces to connect 1,977 villages for the benefit of 61,507 households.

The Regional Upgrade Programme included the upgrading of basic services in remote and isolated areas, addressed the shortage of road, electricity and drinking water access, and aimed to ensure a minimum of local facilities and essential services, notably in the education and health sectors. The Programme has made it possible to connect all the villages in 19 provinces,⁴⁶² and several villages in the six provinces of Al Haouz, Chichaoua, Essaouira, Marrakesh, Rehamna and El-Kalaa des Sraghnas in the Tensift region, to the grid to ensure access to basic services.

Launched in 1996, PERG has enabled the electrification of 40,456 villages comprising 2,124,483 households by connection to electricity networks, and the provision of PV equipment for 51,559 households in 3,663 villages during the period 1998–2009, and 19,438 households in 900 villages as part of the solar project under the INDH during the period 2016–2018. As such, the rural electrification rate reached 99.64 per cent at the end of 2018.

The project to promote the development of photovoltaic pumping systems for irrigation was developed by Moroccan institutions with the support of GEF/UNDP and of which AMEE is the Executing Agency. It focuses in particular on building the capacities of the various actors concerned, raising the awareness of operators and farmers, standardizing solar installations for irrigation and developing the skills of private operators.

The PMNEER aims to disseminate the techniques and applications of renewable energies and energy efficiency in mosques through the installation of equipment to meet the needs of electricity, hot water and efficient lighting. It meets a dual objective, reducing the energy consumption of mosques as well

⁴⁶² Al Hoceima, Azilal, Beni Mellal, Boulemane, Chefchaouen, Driouch, Errachidia, Figuig, Guercif, Jerada, Khemisset, Midelt, Ouarzazate, Tata, Taounate, Taroudannt, Taza, Tinghir and Zagora.

as raising awareness of energy efficiency techniques among citizens.

Over the years, other initiatives have supplemented these programmes, such as the 2014 policy on climate change, the NSDS and Morocco's NDC submitted to the UNFCCC in 2016.

The Paris Agreement invites countries to adopt a long-term low emissions development strategy (LT-LEDS). The 2050 Pathways Platform, a multi-stakeholder initiative launched at COP22 in Marrakesh, aims to support countries developing such strategies. In this framework, the platform supports Morocco's effort to build its LT-LEDS in cooperation with the Department of Sustainable Development.

The 2017 SNDD has seven priority areas, including targets for the energy sector. The 2018 administration reform calls for the implementation of energy-saving measures of 20 per cent and integration of renewable energy to the tune of 20 per cent. The transition to a green economy is supported by the implementation of energy efficiency policies and alignment of urban planning with the principles of sustainable development.

Generation Green 2020–2030 also promotes the use of renewable sources, mostly in irrigation with solar pumps. The PEA encourages the use of renewable sources and technologies and is aimed at energy efficiency in all public administrations.

The PEEB was launched in 2016 by France (the AFD and the Agency for Ecological Transition (ADEME)) and Germany (GIZ), to support the financing of large building projects and national green building programmes. In Morocco, PEEB is working with the Government to develop a national financing mechanism for residential buildings.⁴⁶³

Institutional framework

The Ministry of Energy Transition and Sustainable Development, through its Department of Energy and Mines, is responsible for developing and implementing government policy on energy. The Ministry also guarantees the security of energy supplies and the access of rural and urban populations to commercial energy services, and ensures the safety of people and energy and mining installations.

ONEE was established in 2012 by merging the National Office of Electricity and the National Office

of Drinking Water. ONEE is dedicated to developing the infrastructure for the production, transmission and distribution of electricity, water supply and wastewater treatment. ONEE oversees and operates the national electricity system. The ONEE Electricity Branch maintains and develops the high- and very high-tension electricity network, ensuring electricity flows from production plants to consumption centres. It is the major player in Morocco's electricity market, responsible for power imports and exports and the purchase of electricity generated by independent power producers, surplus electricity from self-generators and all renewable electricity production from MASEN projects.⁴⁶⁴

In 2016, the AMEE replaced the former ADEREE. The strategic objective was to adapt the institution to the new dynamics in the renewable energy and energy efficiency sectors, requiring innovative intervention schemes to develop energy services, including generating resources in the context of complementarity with the operators concerned. AMEE is responsible for the design and implementation of sectoral renewable energy and energy efficiency programmes and the mobilization of financial resources to support renewable energy development projects and energy efficiency promotion in Morocco. AMEE's mission is to implement the action plans of the government policy in terms of energy efficiency. It is responsible, among other things, for setting up and supervising a national plan and sectoral and regional plans for the development of energy efficiency, carrying out promotional actions in the field of energy efficiency, monitoring and coordinating at national level the energy audits carried out and ensuring the implementation of the recommendations and to carrying out awareness-raising and communication actions demonstrating the technical, economic and social interest of energy efficiency.

The first EPR, in Recommendation 12.3, suggested the Government, supported by the ADEREE, create incentives for private investors to attract them to co-finance renewable energy projects and reconsider its electricity pricing policies to allow electricity companies to recover the costs of electricity generation and transmission from renewable sources. The implementation of the recommendation is currently ongoing. New projects are on their way, such as the recent partnership with the Banque Centrale

⁴⁶³ www.peeb.build/imglib/downloads/PEEB_Morocco_Country_per_cent20Brief_Jun_per_cent202019.pdf.

⁴⁶⁴ www.sciencedirect.com/science/article/abs/pii/S2352152X20316431.

Populaire to promote investments in the sectors of the green economy, including renewable energy.⁴⁶⁵

The IRESEN⁴⁶⁶ was created in 2011 by the then Ministry of Energy, Mines, Water and the Environment to support the National Energy Strategy. It promotes applied R&D in the field of solar and new energy. The Institute is positioned in R&D through its resource agency and its research centre. It offers several opportunities to create synergy between the socioeconomic world and the scientific world around collaborative R&D projects.

MASEN was created in March 2010 to oversee the Moroccan Solar Plan announced in 2009 in Ouarzazate. It is a limited company with public shareholders owned by the State, the Hassan II Fund, ONEE and the Energy Investment Company (SIE). As defined by Law No. 57-09, MASEN aims to achieve the development of integrated production of electricity from solar energy, with a minimum total capacity of 2,000 MW by 2020, contributing to the development

of renewable energies. MASEN promotes and develops renewables at and beyond the African continent.

Set up in February 2010 with an initial capital of 1 billion dirhams, SIE is active in the national energy sector as the financial lever, benchmark state investor and joint developer of projects, in particular on energy, renewable energy systems and energy efficiency programmes. The company therefore supports major national programmes covering the medium voltage sector, encouraging investment in energy efficiency and supporting upstream industrial sectors.

The ANRE, created in 2016 with Law No. 48-15, is implementing regulations in the energy field. Its functions include regulating access to electricity networks, setting tariffs for the utilization of transmission and the medium-voltage grid and ensuring the efficient functioning of the energy market.

Photo 15.3: Wind farm, Koudiat El beida, Tangier-Tétouan-Al Hoceïma Region



Photo credit: Department of Sustainable Development

⁴⁶⁵ www.amee.ma/node/991.

⁴⁶⁶ www.iresen.org/?lang=en.

Other institutions

Other institutions are supporting various strategies related to energy, such as the ministries of agriculture, marine fisheries, rural development, water and forests, equipment, transport, logistics, industry, trade, and green and digital economy. The then Ministry of Energy, Mines and Sustainable Development created the National Technical Commissions for Energy Efficiency in 2019, dedicated to improving energy efficiency in the sectors of industry, construction, public lighting and agriculture. These sectoral energy efficiency commissions bring together key sectoral stakeholders.

Electricity market structure

Morocco phased out subsidies on premium gasoline and fuel oil (2014) and diesel (2015). Subsidies on butane are still in place (chapter 3). Data from the Ministry of Energy Transition and Sustainable Development show that, between 2017 and 2019, there was a constant subvention for oil products (around 10 billion dirhams annually), although this was only about one fifth of the peak year 2021, when subventions reached approximately 48 billion dirhams.

Green bonds

MASEN issued the first green bonds in November 2016 for around US\$117 million, to finance Noor Phase I. MASEN's 2019 Noor PV I Project Report shows that the green bonds issued by MASEN were used to fund three PV plants for an approximate total capacity of 377 MW.⁴⁶⁷

15.7 Assessment, conclusions and recommendations

Assessment

Since the first EPR, Morocco has made consistent efforts to address its dependency on external energy sources. The country installed renewable energy plants, constantly improving the percentage of renewables in the energy mix, whose further diversification remains a priority.

Fossil fuel sources will continue to play an essential role in the near future, even if Morocco invests in diversifying its national electricity mix by boosting wind and solar sources, which makes the country dependent on imports of energy products, due to its limited fossil fuel resources. Developing local

renewable energy resources and, where applicable, smart off-grid solutions, would help in this direction.

In 2021, 37 per cent of overall electrical power capacity was produced through renewable energy plants: 13.40 per cent from wind, 16.57 per cent from hydropower and 7.03 per cent from solar.

The declared national objective up until 2030 is that renewable energy sources reach at least 52 per cent of installed capacity. To achieve this ambitious target, Morocco will need to invest US\$30 billion, as estimated by the IEA, which highlights the importance of involving the private sector in financing renewables. Aligning energy prices with the financing costs may result in attracting private sector investments in renewables, energy efficiency and new technologies.

On average, the transport, residential and industrial sectors together generated 80 per cent of the total final energy consumption (TFC). Energy efficiency in these sectors is not sufficiently addressed. In addition, renewable energy sources for cooling and heating, transport and water management are not exploited.

Concerning climate change, the 2016 NDC was revised in 2021. It identifies climate change mitigation measures and estimates related costs. Moreover, Morocco has prepared a National Strategic Adaptation Plan. Even though these important documents were prepared, the economic impacts from climate change on the main economic sectors and the costs of mitigation measures remain unassessed.

Implementation of the recommendations of the first EPR has progressed. Recommendation 12.1 is not implemented as environmental self-monitoring and self-reporting by energy operators is still voluntary. Recommendation 12.2 is only partially implemented. Decree No. 2-17-746 on mandatory energy audits introduced threshold limits. However, secondary legislation on sectoral air emission limit values related to energy sources is lacking. Finally, Recommendation 12.3 suggested better incentives for private investors to co-finance renewable energy projects. The recent partnership agreement with the Banque Centrale Populaire shows positive steps forward. However, the Government has not yet reconsidered its electricity pricing policies to allow electricity companies to recover the costs of electricity generation and transmission from renewable sources.

According to the "Sustainable Development Report 2020 – The Sustainable Development Goals and

⁴⁶⁷ www.climatebonds.net/files/files/Masen_NOOR%20PVI_GreenBond_Reporting_2019%20%28public%29.pdf.

Covid-19”, Morocco is improving moderately in the overall performance of SDG 7, but challenges remain. Regarding SDG target 7.1, almost 100 per cent of the population has access to electricity and 96.8 per cent has access to clean fuels and technology for cooking. However, Morocco lacks fossil energy resources (hydrocarbons, coal) and has a heavy dependence on imports (covering more than 90 per cent of energy needs). Electricity consumption grows steadily, by around 6.5 per cent per year, mainly due to rural electrification and population growth (road infrastructure, tourism, agriculture, industrial platforms). Forecasts show a tripled electricity demand by 2030. In 2017, the renewable energy share in TFC was 10.42 per cent. The extensive use of traditional energy (firewood and charcoal) in rural areas poses a threat to forest cover and an increased risk to climate change. As at July 2021, energy sources are not sufficiently diversified to satisfy this growth.

Conclusions and recommendations

Diversification of energy sources

Morocco has potential for renewable energies (mainly solar and wind), which constitute 37 per cent of the electricity supply in 2021. However, the country still depends on fossil fuels. Electricity demand is expected to triple by 2030. The extensive use of traditional energy (firewood and charcoal) in rural areas poses threats to the environment and has an impact on air emissions.

Recommendation 15.1:

The Government should:

- (a) *Strengthen its efforts to diversify energy sources, especially renewable energies, to meet the growing demand for electricity;*
- (b) *Take action to incentivize in rural areas a rational diversification of energy sources, substituting traditional energy sources with renewable energy sources;*
- (c) *Continue its efforts to reduce the dependency on fossil fuel imports.*

Renewable energies beyond electricity production

Morocco has a consistent but unexpressed potential to exploit renewable energies in transport, heating and cooling, water management and desalination.

Recommendation 15.2:

The Government should accelerate the integration of renewable energy solutions in the sectors of transport, heating and cooling, water management and desalination, and encourage their implementation.

Energy efficiency

The transport, residential and industrial sectors account for 80 per cent of the total final energy consumption, with constant growth rates. Measure on improving energy efficiency and energy intensity in those sectors are not reinforced.

Recommendation 15.3:

The Government should:

- (a) *Ensure the decarbonization of the industrial sector through energy efficiency and renewable energy;*
- (b) *Improve energy efficiency in the transport sector;*
- (c) *Accelerate the introduction of the requirements of energy performance to existing buildings;*
- (d) *Incentivize the refurbishment of existing buildings and the installation of renewable energy sources;*
- (e) *Accelerate the implementation of nature-based solutions to improve energy efficiency at the urban scale to reduce the energy needed to maintain buildings' indoor thermal comfort.*

Climate change

The 2021 updated NDC established climate change mitigation measures and their related costs. Concerning adaptation measures, the country has prepared a National Strategic Adaptation Plan. However, the assessment of the economic impacts of climate change on various economic sectors and the estimated costs of adaptation measures are still lacking. This assessment would represent a step forward for the implementation of adaptation measures in Morocco.

Recommendation 15.4:

The Government should accelerate the implementation of energy efficiency and renewable energy programmes to contribute to greenhouse gas mitigation.

Chapter 16

AGRICULTURE AND THE ENVIRONMENT

16.1 Conditions and activities in agriculture

Morocco is characterized by a great diversity in natural conditions. As a North African country that lies between two climatic zones, temperate in the north and tropical in the south, Morocco is distinguished by four types of climate: humid, sub-humid, semi-arid and arid. The climatic observations, concerning Morocco, carried out over the last decades attest to the progression of the semi-arid climate towards the north of the country. Northern regions enjoy advantageous precipitation patterns, but with poor soil quality, and the opposite is the case in the southern regions. On the whole, dry conditions dominate in much of the country: on average, drought occurs in Morocco every three years.

The agricultural sector has undertaken efforts to develop and modernize. Thanks to the efforts undertaken within the framework of the PMV, the agricultural sector shows better resilience, which is linked in particular to the sector's reduced dependence on cereals. Indeed, the structure of agricultural value added by sector shows a downward trend in the share of cereals in agricultural value added of -11 per cent between the periods 2003–2005 and 2015–2019. This decline was mainly to the benefit of arboriculture (+11 per cent). Thus, agricultural GDP shows sustained and less volatile growth, depending less and less on cereals

during the period 2008–2019 compared with the decades 1998–2007 and 1988–1997.

Land use

The useful agricultural area (UAA) is about 9 million ha (table 16.1) according to data from the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests on the website of the High Commission for Planning (HCP). In 2018, 1.8 million ha were irrigated. This area is supplemented by 21 million ha of rangeland and more than 9 million ha of forestland, which is also used as rangeland. Rain-fed crops (“*bour*”) occupy 81 per cent of the UAA. Moroccan agriculture can be divided into two sectors: intensive industrialized agriculture and peasant farming.

Cereals are the main crops in the rainy areas of the north-west and can be cultivated without irrigation. Morocco's main cereal regions are Doukkala (Casablanca-Settat), Chaouia (Chaouia-Ouardigha) and Gharb (Rabat-Salé-Kenitra). Government policy encourages the conversion of favourable agricultural land into wheat cultivation, while at the same time driving out barley and maize production into marginal agricultural lands. Barley, durum, olives and almonds are mostly cultivated in mountainous areas.

Table 16.1: Land use, 2012–2019, million ha

	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019*
Cereals	5 391.3	4 764.0	5 457.4	3 795.5	5 559.8	4 659.0	3 645.2
Pulses	400.4	404.4	417.9	282.8	283.5	330.3	310.3
Oilseed crops	33.9	37.7	51.6	54.5	33.8	35.3	48.5
Sugar crops				70.2			
Area sown	52.7	60.9	69.4	70.2	68.4	62.7	68.4
Area harvested	46.3	56.9	65.5	64.5	64.8	62.3	65.2
Fodder crops	433.0	431.8	435.5	462.8	473.4	518.8	519.0
Vegetable crops	252.5	236.2	264.2	259.1	253.4	262.0	240.0
Fallow land	1 678.0	1 987.2	1 163.9	1 816.5	1 168.0
Fruit plantations	1 456.6	1 508.0	1 578.0	...	378.0	383.1	389.2
Undergrowth crops	607.4	581.8	612.2	616.2	624.9
Useful agricultural area*	9 189.5	9 082.5	9 047.1	9 100.0	9 069.0

Source: Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, 2021.

Note: * Useful agricultural area does not include undergrowth.

Agricultural activities

Crops

Morocco's main crops are cereals (wheat, durum, barley and maize), citrus (oranges and clementines), olives, fruits (apples, apricots, almonds), sugar beets and pulses (beans, lentils, chickpeas and peas) (table 16.2). Citrus, vegetables and olives are produced on the extensive plains of the Atlantic coast, largely with water supplied by artesian wells. Crops such as cotton, sugar beet and sunflowers are expanding by volume and by farming area. Tea, tobacco and soybeans can be cultivated on the fertile Gharb plain. Pulses are useful for balancing crop rotations with cereals. However, the area in pulses has decreased in the last 20 years and today Morocco has turned from an exporter of pulses to an importer.

Cereal yields in Morocco are variable. For example, soft wheat yields varied from 1.2 t/ha to 2.6 t/ha in the period 2013–2018. Thus, these yields reflect the lack of water and the difficult climatic conditions for rain-fed crops.

Olive trees grow well in Morocco, except in the coastal area, and the production area reached 1,073,492 ha in 2019. About 75 per cent of the crop is processed into table olive oil for the local market and 25 per cent is exported as table olive oil. Fruit production is then dominated by citrus and rosacea.

The market gardening sector is a key sector and contributes positively to Morocco's trade balance. Market gardening alone accounted for nearly 15 per cent of the value added on average in the period 2015–2018. Indeed, citrus and vegetable crops accounted for nearly 2 per cent and 3 per cent respectively, on average, in the period 2018–2020. Early vegetables are intended for export, while seasonal vegetables are intended for the domestic market. Although citrus and vegetables have a very small share of agricultural land cover, their share of agricultural value added is much higher. These niche crops are generally more labour, input and water intensive than cereals.

Oasis agriculture

Oases are a result of human engineering that reconciles the different dimensions of human development. Oases are essential to prevent the spread of sand and stop desertification and are good places to host agriculture and biodiversity. Oases are often organized around date palms grouped in groves and are home to other plants such as medicinal and

aromatic plants (MAPs). Moreover, oases are an essential component of the national heritage.

Photo 16.1: Oasis agriculture



Photo credit: Department of Sustainable Development

Palm trees for date production are located in the Drâa and Ziz valleys, as well as in the provinces of Figuig, Tata, Guelmim, Assa Zag and Tiznit. Palm groves occupy 64,000 ha in 2020 (nearly 6 million trees), compared with 46,000 ha in 2008. The number of trees has declined sharply in the last century due to a fungal disease called “*bayoud*” (*fusarium oxysporum fsp albedinis*): between 10 and 12 palm groves (150,000 ha and 15 million trees) have been completely destroyed by it. Date production increased by almost 95 per cent between 2005–2007 and 2015–2018. This performance is mainly due to the efforts made to upgrade this sector under the contract programme for the development of the phoeniculture sector, 2009–2020, which aimed to achieve production of 160,000 tons by 2020. An effort to valorize production has also been made, with nearly 25,000 tons/year valorized in 2018. A new contract programme for the development of the date palm sector is being finalized with contractual objectives to be reached by 2030 in collaboration with professionals.

Table 16.2: Selected crops, 2013–2018, 1,000 ha

	2013		2014		2015		2016		2017		2018	
	Area	Yield (t/ha)	Area	Yield (t/ha)	Area	Yield (t/ha)	Area	Yield (t/ha)	Area	Yield (t/ha)	Area	Yield (t/ha)
Durum	944.9	2.01	904.8	1.56	998.5	2.41	837.8	1.04	1 087.8	2.02	996.6	2.44
Wheat	2 259.3	2.2	2 081.4	1.8	2 275.3	2.5	1 575.8	1.2	2 296.4	2.1	1 891.5	2.6
Barley	1 967.1	1.4	1 585.2	1.0	2 000.2	1.7	1 207.6	0.5	2 001.5	1.2	1 598.7	1.8
Maize	178.1	0.7	137.4	0.7	125.1	0.7	138.8	0.9	130.7	0.9	148.2	0.8
Sugar beet	35.7	60.0	51.9	61.8	57.1	63.1	59.3	71.2	56.3	66.5	53.6	69.2
Broad bean	205.5	0.8	191.0	0.9	192.2	0.5	88.4	0.6	131.3	0.7	137.0	1.1
Fallow	1 678.0		2 150.0		1 341.0		1 816.5		1 168.0		n.d.	
Citrus	110.8	16.6	114.0	23.8	117.0	18.9	122.5	19.5	125.0	21.6	126.7	20.1
Olives	922.2	1.5	964.7	2.0	1 025.2	1.4	1 027.3	1.7	1 039.7	1.2	1 064.9	1.7
Dates	57.4	2.4	57.7	2.2	57.8	2.2	58.1	2.7	58.3	2.8	59.1	2.4
Total	n.d.		9 581.5		9 567.6		9 100.0		9 069.0		n.d.	
Early tomatoes	6 304.0	144.7	6 677.0	128.9	8 126.0	120.7	7 474.3	128.6	8 002.0	122.4	7 725.0	133.1
Season tomatoes	6 723.5	44.7	8 173.0	36.1	8 231.0	37.9	7 360.0	32.2	7 026.0	34.6	7 305.0	41.4
Tomatoes for processing	989.0	81.6	867.0	86.9	862.0	94.2	420.0	84.0	860.0	81.4	925.0	85.5

Source: Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, 2021.

Photo 16.2: Argania (*Argania spinosa*)

Photo credit: Department of Sustainable Development

Oasis agriculture also has other assets. Agricultural production has evolved from traditional irrigated cereals for personal consumption to the highly diversified production of vegetables and fruit for local and export markets (tomatoes, potatoes, lettuce, melons, roses, almonds, figs, apples, quinces, olives). The diversification of agriculture in the oasis areas has been made possible thanks to the efforts of the State, particularly in the framework of agricultural strategies and plans. In this context, the PMV has given great importance to these areas through specific programmes, including the adoption of programme contracts ratified with professionals in the sector (e.g., date palm, perfume roses and saffron), the projects of Pillar II of the PMV relating to solidarity agriculture, and the National Strategy for the Development of Oasis and Argan Zones adopted in 2013, in addition to income-generating activities implemented under the INDH. Thanks to the development of irrigation equipment, agricultural land is being reclaimed from the steppes. The farms are small (less than 1 ha) and the plots tiny, but this gardening is very flexible and profitable, provided that the labour force, mainly female, is available. Livestock rearing, especially Dmane sheep, is part of this diversity and animals can be fed with agricultural by-products. In the oases, no family lives exclusively from agriculture; other sources of income include tourism, handicrafts and remittances.

Oases and argan groves are key sectors in the country and are designated by the FAO as agricultural heritage of global importance. A national project on the management and biodiversity of five oasis systems is under way. In 2017, a project to revitalize the oasis agro-ecosystem through an integrated landscape approach was launched in the Drâa-Tafilalet region.

Recent pressure created by climate change has threatened the oasis ecosystems. The desertification affects both plants – some of which are reaching a non-renewable state – and the communities living in these areas, which tend to already be vulnerable.⁴⁶⁸ This encourages a rural exodus, mostly of men; approximately 22 per cent of them move elsewhere within Morocco and 11.4 per cent move to foreign countries, according to a 2015 estimate.⁴⁶⁹

Social norms place women in a position that affects their rights to land, access to finance and technology,

and involvement in decision-making processes. Climate change will be more detrimental to women because, as they have lower incomes, fewer rights and less social recognition, it is more difficult for them to adapt than men. However, their traditional knowledge contributes to maintaining efficient production while preserving resources.⁴⁷⁰

In addition, the PMV targeted the revalorization of date palm groves with the planting of 3 million trees by 2020. This target was achieved. In partnership with various international stakeholders, the Government is engaged in different oasis conservation and revitalization programmes. Further, in 2016, the country presented the Sustainable Oases Initiative during COP22 in Marrakesh, which aimed to boost efforts for their conservation. Associations such as the Association Oasis Ferkla for the Environment and Patrimony (AOFEP) also work in the field to implement projects involving the local community with its traditional knowledge, in order to increase the resilience of oases to climate change.⁴⁷¹

Organic agriculture

Organic products are currently classified into two categories: products of spontaneous MAPs and products of cultivated plants. The total area engaged in associated agriculture in Morocco in 2017–2018 amounted to 282,480 ha. This included 9,500 ha of cultivated species (11,000 ha in 2019), of which nearly 1,000 ha of crops were in the process of conversion to organic production, and 273,000 ha of spontaneous MAPs.

Prickly pears, citrus and MAPs represent the largest areas of cultivated species, while the argan tree, MAPs and spontaneous cacti account for the majority of the areas of non-cultivated plants. In parallel, Moroccan organic animal production exists in small quantities on the market. These products include poultry, red meat (sheep and goats), eggs, goat cheese and honey. Beekeeping is the main Moroccan animal production recorded: there were some 1,242 beehives in 2015, 190 of which were under conversion to organic production.

Eight regions are mainly concerned with organic production. The cultivated plantations are located in Rabat, Azzemour, Fès, Taza, Beni Mellal, Marrakesh,

⁴⁶⁸ <https://e360.yale.edu/features/a-drive-to-save-sahran-oases-as-climate-change-takes-a-toll-cop22;www.ipcc.ch/srccl/chapter/chapter-3/>.

⁴⁶⁹ https://ma.boell.org/sites/default/files/femmes_oasiennes_et_changement_climatique_au_maroc.pdf;https://heindehaas.files.wordpress.com/2015/05/de-haas-2007-gestion-d-eau-oasis.pdf.

⁴⁷⁰ https://ma.boell.org/sites/default/files/femmes_oasiennes_et_changement_climatique_au_maroc.pdf.

⁴⁷¹ <https://aofep.net/>.

Agadir and Taroudant. MAPs are found in almost all the regions, although verbena is specific to Marrakesh, saffron to Taroudant (Taliouine) and caper to Fès. The Souss-Massa valley stands out as the main market gardening region, due to its subtropical climate favourable for off-season production. Certain coastal regions (Azemmour and Rabat) also qualify for this type of production. Fruit production is limited to the regions of Marrakesh and Agadir, although there is potential for expansion to other fruit producing regions (Meknès, Azrou, Midelt, Errachidia).

Animal husbandry

Livestock numbers remained fairly stable over the period 2008–2020 (table 16.3). While the number of cattle and goats remained stable, the number of sheep increased by 5 million head.

Bovines

According to the 2016 General Census of Agriculture, the number of cattle farms is 783,000. On the majority of dairy farms, barns hold fewer than 10 cows and productivity is much lower (at 2,500 l milk/year) than on other dairy farms. The remaining cattle farms are dual purpose, and herds are generally composed of local breeds or crosses between local breeds and Holstein. Dual-purpose farms are mostly beef oriented as local cattle breeds rarely produce more than 500 l of marketable milk a year.

Milk production is concentrated in the north-western part of the country, where the main production areas are Loukkos, Gharb, Tadla, Doukkala and Haouz, which have highly favourable agroecological conditions. The dairy cow sector progressed in the last decade with the importation of highly productive dairy livestock (mostly Holstein – 6,000 l milk/lactation – and Montbéliarde), crossing with local breeds, and improved herding technology and hygiene. The sector depends on importation for genetic improvement of the breed, and on concentrated feed in drought years. Local breeds regressed notably. The best domestic

results, however, are seen on irrigated farms in the Taroudant region.

Bovine meat is essentially produced with calves from milking cows, but also from local breeds. The bovine breed Oulmès-Zaër is known for its meat quality. The insemination of local breed females with meat breeds allowed a progression in meat production from 400,000 tons in 2008 to 600,000 tons in 2018. Currently, 99 per cent of red meat needs are covered.

Sheep and goats

Pastoral nomadism is the system most commonly adapted to Morocco's conditions and a number of local rustic breeds of sheep and goats use the country's vast desert and mountain ranges and various ecosystems. In the mountainous regions and on high plateaus, mixed herds of sheep and goats are kept exclusively on range. In the cereal regions, animals are fed on crop residues (straw and bran) and eventually supplemented with forage crops and concentrate feed.

Fattening units are developed next to urban areas, producing animals for *Aïd El Khebir*, which has an impact on the organization of the sector. On this occasion, 5.5 million sheep are slaughtered – half of the annual volume. The Sardi sheep is a highly desired breed. In the northern provinces, some mixed goat herds, for milk and meat, or specialized dairy units, producing fresh cheese, can be found.

Poultry

Efforts have been undertaken by the agricultural sector to modernize the poultry sector in Morocco, notably through the implementation of the poultry sector development contract programme for the period 2008–2020. To this end, national production of white meat has doubled between 2008 and 2018 to reach 670,000 tons in 2018. This level of production meets the country's entire needs. Per capita consumption of white meat increased by 46 per cent between the period 2003–2007 and the period 2015–2018, when it reached 19 kg per annum.

Table 16.3: Livestock, 2008, 2013–2020, 1,000 head

	2008	2013	2014	2015	2016	2017	2018	2019	2020
Cattle	2 814.00	3 172.98	3 238.69	3 291.05	3 326.13	3 364.00	3 441.00	3 338.58	3 175.85
Sheep	17 077.70	18 979.70	19 230.84	18 509.60	19 527.14	19 863.83	19 880.19	21 592.06	22 107.10
Goats	5 117.90	5 905.39	6 147.22	6 231.39	5 516.10	5 741.26	5 731.79	5 993.67	5 980.78

Source: Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, 2021.

Photo 16.3: Desertification, southern Morocco

Photo credit: Department of Sustainable Development.

In parallel, during the same period, egg production increased remarkably, from 3.5 billion to 5.7 billion units, i.e., an average consumption of 163 eggs per capita. The improvement in per capita consumption of poultry products constitutes strong improvement in the nutritional status of the Moroccan population. The sector has experienced great dynamism in terms of exports and penetration of foreign markets, particularly sub-Saharan. In 2018, 21 million units of meat-type hatching eggs were shipped.

Organizational types of agricultural production units, including ownership

There are two main types of agricultural production unit: (i) 70 per cent of Moroccan farms are less than 5 ha, 33 per cent of which are farmed or cultivated by traditional methods, producing for the family's needs and local markets; and (ii) a limited number of large farms occupy an important part of the UAA and use modern technologies in order to comply with foreign markets.

Precision agriculture is a farming management concept based on observing, measuring and responding to inter- and intra-field variability in crops with the goal of optimizing returns on inputs while preserving resources. An intermediate category of

farms, ranging between 5 ha and 20 ha, is emerging. Since 2008, precision agriculture has entered the agricultural sector in Morocco through initiatives taken by professionals in the sector and partners, to introduce new technologies and adapt them to the specificities of Moroccan farming. These include the:

- Integration of precision agriculture by some farmers to gain better knowledge of their plots and crop needs, and to increase productivity through the use of optimization tools and the automation of processes;
- Implementation of a disease detection system;
- Use of drones for crop treatment, for example in the Rabat-Salé-Kenitra Region;
- Development of multi-service mobile applications to support farmers.

In addition, digital platforms have been set up by the Department of Agriculture for geolocation of plots, fertility maps, monitoring of food prices and sector statistics.

Privatization

Traditionally in Morocco, much of the agricultural area is collectively owned by tribes (*guich*). Their councils (*nouabs*) decide on use and attribution of the

land among the members of the tribes (settled in *douars*). Collective lands cannot be sold or hired, unless to moral persons and with the permission of the *nouab*. Rangeland is used collectively, with rules decided by the *nouabs*, and crop land is distributed among families. However, this collective area is decreasing in favour of privately owned crop land (*melk*). According to the 2016 General Census of Agriculture, *melk* accounts for almost 77 per cent and collective land for almost 17 per cent of agricultural land.

A number of decrees govern the use of *melk*. Loans cannot be taken out on collective land, unregistered land, marginal land and inherited plots of unknown status. Privatization (*melkization*) of land is ongoing. The current legislation allows members of cooperatives to privatize their attributed plot of collective land and trade it on the land market to investors.

Land registration

Land registration is not compulsory. Procedures are slow and complex; farmers do not see their interest represented in registration or ignore this possibility. While 76 per cent of agricultural land is privately owned, only 15 per cent is formally registered.

In the framework of the PMV, since 2016, the Ministry of the Interior has been in charge of land registration and plans to register 300,000 ha of collective land in the name of the rights holders, for free, 85,000 ha of it with *habous* status (under control of religious entities). These 300,000 ha are collective land in irrigated areas. In this context, this agricultural land registration operation is carried out through the reduction of fees for requisition registrations in order to encourage land registration in rural areas. This makes it possible to maintain legal security and for owners to assert their property.

Prevailing agricultural practices

Use of fertilizers and pesticides

Agriculture has boomed due to the effects of the PMV. Imports of fertilizers have increased in recent years. However, imports represent only part of total fertilizer consumption, as Morocco produces its own fertilizers (potassium). Despite the fact that Morocco has fertility maps for each province, in the majority of cases, the application of fertilizer is empirical and does not take into account actual crop needs and soil condition. The current average consumption of fertilizers (50 kg/ha) remains lower than in Europe (140 kg/ha in France and Spain).

The website of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests provides information about the certification of pesticides and their correct use in the field. However, there are no comprehensive data on the type and the quantity of fertilizers and pesticides used.

Manure management

In Morocco, cattle manure that is not left on pasture is stocked in unconfined piles with bedding material, while sheep and goat manure is stored in open areas without cover. Losses through volatilization (nitrous oxide) and leaching can occur during storage. The manure management of the poultry sector (laying hens and broilers) seems to be mastered by pit storage and litter stacking, but half of the manure of cattle, goats and sheep (3.2 million livestock units or 38.5 million tons a year) is neither collected nor spread in the proper way.

Improved practices to collect, handle, treat and store manure are rarely applied in Morocco, while the total livestock herd is increasing in size and production systems are intensifying. No data exist on manure management practices. Technicians in Morocco are familiar with the practices and technology associated with manure collection, handling, treatment and storage and non-skilled workers could easily adopt them. However, low adoption levels mean that knowledge and awareness among farmers may still be limited. The use of manure as organic fertilizer is not sufficiently promoted, as the vast majority of soils lack organic matter.

Water use

Morocco's agriculture consumes more than 87.3 per cent of the renewable water and gravity irrigation is dominant (chapter 9). Of the 8.7 million ha of UAA, 1.46 million ha are irrigated. Morocco is still actively developing its irrigation potential, aiming to extend its irrigated area by another 160,000 ha by 2020. These efforts are part of three programmes:

- The Irrigation Extension Programme (PEI) initially provided for the hydro-agricultural development of delineated irrigation areas associated with dams over an area of nearly 160,000 ha; this objective has been revised to 119,000 ha. At the end of 2020, more than 85,000 ha are being developed under this Programme;
- The National Programme for Saving Irrigation Water (PNEEI) consists of the conversion of existing irrigation techniques into localized irrigation, on a total area of 550,000 ha (box 16.1). By the end of 2020, nearly 635,000 ha had been

- equipped with drip irrigation, resulting in the saving of nearly 1.6 billion m³ of irrigation water;
- Public–private partnership (PPP) projects focused on public service irrigation, including two projects of desalination of sea water for irrigation in Chtouka Ait Baha and Dakhla. The area designated and managed under PPPs at the end of 2019 was 33,200 ha.

These irrigation programmes have made it possible to equip nearly 873,049 ha with drip irrigation, for an investment of nearly 36.6 billion dirhams for the benefit of 270,579 farms. This has resulted in a water saving of more than 2 billion m³. In addition, the programme of rehabilitation of small and medium-sized works and irrigation networks (*Seguia Krichfa* and *khattara* systems) aimed at rehabilitating and developing a total area of 100,000 ha by 2020. At the end of 2018, the surface area achieved amounted to 151,220 ha nationwide, exceeding the 2020 objective by more than 50 per cent, for a total investment of 2.7 billion dirhams.

Efforts to mobilize and manage irrigation water are being pursued as part of the new strategy, Generation Green 2020–2030, and as part of the PNAEPI.

Employment in the agriculture sector

In 2018, the agriculture, forestry and fishing sectors employed about 32 per cent of the nation's workforce and was the largest employer in the country (3.714

million workers, of which 1.25 million are female). In 2018, these sectors and other services generated 11.23 per cent of GDP (constant price 2007). Irrigated agriculture represents 45 per cent of the agricultural added value.

Self-sufficiency

The policy adopted by Morocco is to ensure the country's food security in basic products rather than self-sufficiency. Thanks to the evolution of food availability, coverage rates have improved significantly since 2008. These coverage rates are almost 100 per cent for fruit and vegetables, 99 per cent for red and white meat, 98 per cent for milk, 65 per cent for cereals and 47 per cent for sugar. More than 40 per cent of Morocco's consumption of grains and flour is covered by imports from the United States and France, respectively. In a normal year, Morocco produces two thirds of the grains needed for domestic consumption, but it varies from 30 to 80 per cent. Cereal imports (wheat and maize) represent more than one third of the import of agricultural products, which is expensive in foreign currency for the country. In 2016 (a drought year), Morocco imported 6.3 million tons and in 2017, 3.6 million tons of wheat. Thanks to the evolution of agricultural exports between 2008 and 2020, which rose from 15 billion dirhams in value in 2008 to 40.26 billion dirhams in 2020, Morocco's trade balance deficit for agricultural products has been reduced by nearly 7 per cent, from -25.2 billion dirhams in 2008 to -23.49 billion dirhams in 2020.

Box 16.1: Projects to save water in agriculture in Morocco

About 60 per cent of agricultural irrigation water is lost, mostly through run-off and percolation. For this reason, micro-irrigation is promoted and subsidized in Morocco.

The PNEEI was launched in 2008 with the objective to convert 550,000 ha of land irrigated by gravity or sprinklers to drip irrigation by 2020. In 2018, 560,000 ha were equipped with drip irrigation. The subsidies were raised to 80 per cent for farms over 5 ha and to 100 per cent for farms below 5 ha and the conversion area jumped from 10,000 ha/year to 50,000 ha/year. It is expected that, by 2030, 900,000 ha will have been converted and water saving should reach 2.5 billion m³ per year, in part by improving conveyance efficiency and volumetric pricing. The extension of drip irrigation implies the expansion of vegetable crops such as tomatoes and of orchards, as drip irrigation is not suitable for field crops. By the end of 2018, the conversion to drip irrigation had saved almost 1.6 billion m³ of irrigation water.

The technical change was accompanied by technical advice on irrigation practices, the choice of crops and strengthened linkages with agro-industry and export markets. The expected outcomes were water saving of 30–50 per cent (1 billion m³ per year).

In response to the increasing demand for water from agriculture, along with groundwater depletion, Morocco introduced "aquifer contracts", voluntary agreements between the Government and the groundwater stakeholders (ABHs, water user associations and farmers) aimed at regulating and improving the technical and financial management of groundwater at the local level. The first aquifer contract in Morocco was introduced in 2006, for the Souss aquifer, where the groundwater represents 95 per cent of the total water used. It includes the installation of water meters for all groundwater users, and the enactment and enforcement of prohibition measures. In 2016, three aquifers (Tadla, Haouz, Saïs) were managed under an aquifer contract, in order to comply with a condition of a World Bank loan.

Trading

The liberalization of the agricultural sector, recommended by the World Bank and International Monetary Fund, started in 1985 and is still ongoing. The agreement signed with the European Union, which has been in force since 2000, introduced the progressive liberalization of exchanges of agricultural products. Morocco was granted “advanced status” with the European Union in 2008. In parallel, a bilateral agreement to liberalize 45 per cent of export value immediately, and 70 per cent within 10 years, entered into force in 2012.⁴⁷² Moroccan fruit, vegetables, dairy products, oilseeds and food conserves have been totally liberalized. However, sensitive export products, such as tomatoes, are subject to export quotas and/or minimal entry prices.

Private–public partnerships

PPPs concerning agricultural land consist of the rental of such land for a long period of time, up to 40 years, to private investors who undertake to carry out agricultural investment projects.

The main objective of such PPPs is to mobilize national and foreign private capital for the benefit of the agricultural sector and to enhance land assets, contribute to the development of the main agricultural sectors and create employment in rural areas. The land mobilized is in the private domain of the State or is collective or *habous* land. From the start of the PMV until the end of 2018, nearly 1,639 projects have been launched for a contracted area of 135,522 ha. This has generated an investment of 25.7 billion dirhams and created 71,800 jobs.

Agricultural aggregation is a voluntary partnership between a group of farmers and a food processing or marketing company. Agricultural aggregation is an innovative organizational model for organizing small farmers around private actors or professional organizations. It allows agro-industrial aggregators to secure supply with guaranteed, traceable, quality production, and allows aggregated producers to benefit from modern production techniques and financing and to access the internal and external market thanks to the support of aggregators.

By the end of 2020, nearly 63 aggregation projects have been implemented under the PMV on 143,000 ha for the benefit of 56,500 aggregators. About 80 per cent of the small farmers aggregated in the crop sectors have a farm of less than 5 ha.

16.2 Pressures from agriculture

Biodiversity

Intensive and unregulated agriculture is a major threat to biodiversity, particularly because of the transformation of natural and semi-natural habitats, water use, soil erosion, and diffuse pollution of water and soil by fertilizers and pesticides. There are no data on natural areas converted to agricultural land.

Forests

Moroccan forests are traditionally used as rangeland or as a source of feed (young branches); they are globally estimated, in a normal year, to contribute 17 per cent of the animal feed supply. Forest grazing is very extensive and implies the constant movement of animal herds. The majority of the range forest is situated in the semi-arid and arid zones and is threatened by desertification induced by the growing aridity and the recurrent droughts of recent decades.

However, the most important factors in forest degradation are overgrazing (3 to 5 times the carrying capacity) and excessive collection of fuel wood (some 3.5 times the renewal potential). In recent decades, 30,000 ha per year were lost due to overgrazing and collection of wood, and desertic vegetation extended to the north by up to 100 km. The legal prohibition on grazing has been implemented less in recent decades. On the other hand, in some cases, cattle-grazing on the alfa steppe has been abandoned due to the low forage quality.

Soil

A large area of the country is more or less infertile (deserts, mountains) and Morocco’s soils are rather fragile overall, due to their low organic matter content (< 2 per cent), even in humid areas. Except on the alluvial plains of Gharb and Saïs, soils are shallow and tend to accumulate salts (NaCl and gypsum).

Soils deteriorate because of natural factors (slopes, aridity, heavy rains, wind) and anthropogenic factors such as deforestation to gain irrigated land, cultivation of marginal rangeland, and the abandonment of fallows in crop rotation. As a result, this last factor induces the relocation of grazing animals to rangeland. Even more worrying is the sporadic cultivation of rangeland with the removal of the natural cover, leaving the soil bare and subject to erosion. Within 30 years, 2 million ha were turned to wasteland.

⁴⁷² www.europarl.europa.eu/doceo/document/TA-7-2012-0055_EN.html.

Furthermore, the siltation of dams is a major challenge to soil protection. The storage capacity of dams lost over the last 50 years is 1.4 billion m³, which corresponds to the irrigation of 150,000 ha of agricultural land. On average, the 122 main dams have lost 10 per cent of their capacity; more specifically, the Mohamed VI Dam in the Moulouya basin has lost 55 per cent and the Nakhla Dam in Tétouan is totally sedimented. Even if the dams were designed with siltation in mind, desilting dams is a complex undertaking which is often not a viable option, either economically or technically.

On cultivated plains in the coastal areas, aquifers become more saline because groundwater pumping induces seawater intrusion and salts are leached through percolation of irrigation water. Saline soils have increased from 350,000 ha in 1992 to 500,000 ha in 2015. The increased concentration of salts and chemicals due to the reduction of leaching due to water saving techniques is problematic. On large farms in the arid Bahira region, irrigation induced secondary salinization of the soils, even though the groundwater is of good quality. The salts accumulated near the root zones are subsequently leached into the groundwater by the recommended watering after harvest. Of the 29 billion m³ available for irrigation, 1.1 billion m³ (3.8 per cent) contain 1–2 g/l and 1.0 billion m³ (3.4 per cent) contain more than 2 g/l. Watering after harvest is recommended when the salt content of the water is above 1 g/l.

Erosion also results in nutrient losses, affecting water quality in the dams and eutrophication of the lakes. For instance, in the Sidi Salah basin, annual losses were estimated at 41 kg/ha of nitrogen, 16 kg/ha of phosphorus and 20 kg/ha of potassium. Inadequate manure management also leads to local water pollution, but no figures are available.

Another problem is the soil contamination due to poor water quality. In the Sebou basin, the heavy metal content of all agricultural soils was well above the French AFNOR standard (NFU 44-041), in particular for chromium because of the use of water from Fès tanneries.

Water

The concentration of nitrates is a good indicator for pollution by pesticides, which are more complicated to analyse. Pollution due to farm inputs and overexploitation affects the quality of a land surface estimated at 500,000 ha.

Whereas run-off fell by 35 per cent in 30 years, public irrigation grows by 2.3 per cent per year. According to

the 2015 PNE, water demand was estimated at 12.04 billion m³ in 2010 and 14.5 billion m³ in 2020. The demand is expected to increase up to 16 billion m³ in 2050.

Groundwater resources – which provide almost 40 per cent of the total irrigated area and contribute to more than 50 per cent of the economic value added generated by all irrigated areas – are a particular concern. About 5 billion m³ are abstracted every year against a renewable potential of 3.4 billion–4 billion m³, with 1 million m³ groundwater depletion each year. The figure of 441,430 ha of land irrigated by groundwater (2004) has not been updated and seems to be grossly underestimated.

In closed basins, the outflow is around 5–10 per cent of the total run-off; much of it is uncontrollable floodwater or water with a very degraded quality. The process of basin closure started in the Souss-Massa in the 1980s and moved north to the Tensift and Oum Er Rbiâ basins and is under way in the Sebou basin. There, the surplus water will be diverted to irrigate a further 100,000 ha in the Gharb, irrigation development in the Middle Sebou and water transfers to the Saïs plain and further south. For instance, although showing a deficit of 840 million m³/year, the Oum Er Rbiâ basin is still witnessing an expansion of irrigation in Khenifra and the Azemmour–Bir Jdid area. Although the Law on Water demands a national water information system, the data on water abstraction are incomplete and inadequate in a situation of basin closure.

The Government has started the registration of all wells existing up to 2015. The actual monitoring of water consumption is hampered by heavy constraints: independent wells are largely scattered over the territory and water meters are mostly missing. The officially registered number of 100,000 existing wells is considered to be largely underestimated. Furthermore, new ones are dug every day. On the other hand, some wells are no longer in use, following the receding of groundwater levels. The drought of 2015–2016 has led to an increase in drilling in a context where farmers have been able to invest more heavily in wells thanks to subsidized irrigation equipment. In oases, date orchards (in mechanized monocultures) are irrigated by pumping in deep groundwater at the cost of ecologically fragile steppes.

Development and well-being of local communities

Pesticides and manure may also leach into the drinking water sources and provoke poisoning and disease. In order to mitigate the risk of agrochemical pollution (by

fertilizers and pesticides), the National Office of Agricultural Advice deploys an annual programme of awareness-raising and agricultural advice to farmers. Within this framework, in 2018 alone, nearly 4,200 agricultural advisory interventions were carried out for the benefit of 30,000 beneficiaries to raise awareness about the use of fertilizers and pesticides. Law No. 34-18 on Phytopharmaceutical Products was adopted in 2020 to regulate the use of pesticides.

The more sedentary lifestyle of nomads and their herds, and increased human occupation of forest zones, have induced deep changes in forest use. The ban on grazing has been less respected over recent decades. Any fall in productivity in grazed areas would finally lead to the impoverishment of the population living on forest land and induce even more pressure on it.

Human health

Health problems may rise with the consumption of drinking water polluted by livestock effluents and pesticides.

16.3 Impact from and adaptation to climate change

Morocco is more exposed than other countries to the effects of climate change and extreme droughts, which have negative effects on agricultural production. Heavy rain, desert winds and droughts have negative impacts on the soil and provoke erosion in sloping and mountainous regions. Moroccan farmers are used to dealing with such problems; however, these issues will become more dramatic with climate change. The Government is well aware of the issue. Climate change is perceived by farmers mainly as more erratic rains, more erosion and a drop in soil fertility.

Impact from climate change

Every decade since 1970, there has been an increase in temperature of 0.5°C, well above the global average

of about 0.15°C. Since the beginning of the 20th century, Morocco has experienced an increase in its average annual temperature of around +1.5°C. This increase is observed throughout the country. For Morocco, the increase in average annual temperature simulated by the global numerical climate models by 2050 is about +1.5°C on the RCP4.5⁴⁷³ scenario and +2°C on the RCP8.5 scenario.⁴⁷⁴

In 2018, GHG emissions from agriculture amounted to 20,066.77 tons CO₂-eq., of which 39.89 per cent was CH₄ and 59.94 per cent was NO₂ (table 16.4).

According to modelling in the Special Report on Emission Scenarios (SRES), even with the fertilization with atmospheric CO₂, the yield trend remains negative. Agricultural GDP could drop from -3.1 per cent to -15 per cent, and food processing from -11 per cent to -61 per cent. However, according to various experts, agricultural output will not be drastically impacted before 2030 but could be strongly affected thereafter. Furthermore, thanks to an expansion of irrigation and the development of other economic sectors, economic growth may be becoming less sensitive to the climate.

Adaptation measures

In order to improve the resilience of the agricultural sector to climate change, several climate change adaptation measures have been undertaken in the framework of the PMV. Indeed, irrigation water control and rationalization has been at the heart of the PMV: the PNEE, the PEI downstream of dams, the Programme for the Promotion of Public-Private Partnerships for the Development and Management of Irrigation, which aims to preserve groundwater by mobilizing non-conventional water in the framework of various projects, and the Small and Medium Hydraulics Programme. These programmes have made it possible to save more than 2 billion m³ of irrigation water by the end of 2020.

Table 16.4: Emissions from agriculture, 2004–2018, gg CO₂-eq.

	2004	2006	2008	2010	2012	2014	2016	2018
Total	15 572.9	15 404.9	16 032.9	17 487.8	18 175.5	19 112.2	19 214.2	20 729.3
Enteric fermentation	6 478.6	6 461.3	6 501.5	7 040.9	7 539.2	7 608.1	7 964.9	8 211.2
Manure management	1 174.0	1 187.1	1 218.4	1 319.9	1 410.5	1 474.4	1 515.0	1 590.3
Rice cultivation	7.7	8.8	11.2	13.1	16.1	7.7	13.2	14.2
Manure left on pasture	7 864.0	7 712.8	8 271.5	9 085.7	9 185.7	9 988.0	9 687.0	10 879.6
Application of urea	48.6	34.9	30.3	28.2	24.1	34.0	34.0	34.0

Source: National GHG Inventory, 2018.

⁴⁷³ Representative Concentration Pathway.

⁴⁷⁴ www.finances.gov.ma/Publication/depf/2020/PolicyBrief18.pdf.

Photo 16.4: Poor soil, Safi Province, Marrakech-Safi Region

Photo credit: Department of Sustainable Development

In addition, the Programme for the Conversion and Intensification of Fruit Growing aims to convert cereal crops that are sensitive to climate variability to more resilient and land-use-enhancing crops, particularly fruit plantations. The PMV has worked to strengthen climate risk management through the adoption of multi-risk climate insurance for cereals, pulses and oilseeds and for fruit growing.

In addition, programmes for the conservation of ecosystems and biodiversity have also been undertaken, mainly within the framework of the National Strategy for the Development of Oasis and Argan Zones and the National Programme for the Development of Rangelands and the Regulation of Transhumant Flows.

The strengthening of agronomic research and the development of its achievements are among the axes of the PMV to adapt to climate change, notably through, for example, agricultural land use maps, the conservation and development of phylogenetic resources, support for the creation of drought-resistant cereal varieties and the development of in vitro date palm plants.

The effort to adapt to climate change is pursued within the framework of Generation Green 2020–2030,

which aims to continue and strengthen the adaptation programmes of the PMV with the strengthening of human capital. These incentives could help achieve SDG targets 2.4 and 13.b.

The NBSAP incorporates an objective of conserving crop and livestock genetics and includes a strategy for conserving and enhancing crop genetic resources. The number of varieties conserved in gene banks has increased from 22,000 in 2008 to 67,970 in 2019.

Climate change adaptation measures focus on the issue of water in the agricultural sector, forests and biodiversity. Sensitive ecosystems, such as oases, arid regions and mountains, are also targeted. Women and young people are overrepresented among the unemployed in rural areas and the PMV and Generation Green 2020–2030 include specific measures to address this situation.

The Department of Water and Forests of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests has developed a drought early warning system for 2020. The World Bank had earlier

financed a project on integrating climate change into the PMV.⁴⁷⁵ Other projects have also been launched:

- Project for Adaptation to Climate Change in Oasis Zones (PACCZO);
- Project for Solidarity and Integrated Agriculture in Morocco (ASIMA);
- Project for the Integration of Climate Change in the implementation of the PMV (PICCPMV);
- Revitalization of oasis agro-ecosystems through an integrated and sustainable landscape approach in the Drâa-Tafilalet region (OASIL).

In 2016, the ADA carried out a mapping of climate change up to 2050 in 16 provinces, highlighting the effects of such change on agriculture (drought and rainfall erosion).

The Department of Agriculture launched the African Agriculture Adaptation Initiative at COP22, which aims to reduce the vulnerability of African agriculture to climate change by:

- Promoting the implementation of concrete projects to improve soil management;
- Agricultural water management, climate risk management and capacity-building and financing solutions;
- Integrating the “Adaptation of African Agriculture” aspect at the heart of climate debates and negotiations;
- Mobilizing a substantial part of the climate funds.

Mitigation of the agricultural sector

The agricultural sector has put some measures in place. It has proposed a portfolio of actions to meet the 2030 emissions reduction targets set out in the NDC. These measures focus on tree planting programmes. The main species planted are olive trees, citrus fruits, fruiting rosaceous plants, date palms, argan trees and cactus, planned within the framework of the sector programme contracts and pillar II of the PVM, and the fodder shrub planting programme planned within the framework of the National Programme for the Development of Rangelands and the Regulation of Transhumant Flows. Between 2008 and 2020, these planting programmes made it possible to plant an area of nearly 500,000 ha, i.e., the equivalent of planting more than 12 million trees per year, in order to reach the PMV objective by 2020. This has contributed to improving the carbon sequestration potential of the agricultural sector.

The Argan Farming Development in Degraded Environments project is the first climate finance project to address both mitigation and adaptation to climate change. The two main objectives of this project are: (i) to preserve the Arganeraie Biosphere Reserve (RBA), the only argan biosphere reserve in the world, by mitigating the effects of climate change and contributing to carbon sequestration (reducing the emission of 604,223.30 t CO₂-eq.); and (ii) to create conditions for stakeholders to develop arganiculture orchards in compliance with the NAMA. The project is a first step in helping to unlock the full potential of carbon sequestration in the RBA. It should foster a new model of sustainable rural economic activity based on the resilient agricultural system in the vulnerable areas of the RBA and support communities to adopt this model and abandon the old model based on the excessive use of groundwater.

These efforts are being pursued within the framework of Generation Green 2020–2030, which also provides for the strengthening of planting programmes, promotion of organic farming on 100,000 ha by 2030, promotion of the use of renewable energies, in particular solar energy for irrigation, promotion of soil conservation techniques and installation of biomass cogeneration units.

In 2016, FAO examined in detail 12 options for mitigation measures in terms of their cost and benefit for Morocco. These measures are valid not only with regard to climate change but also generally with regard to developing more environmentally friendly agriculture. The potential GHG mitigation in grassland management is among the highest of the technologies analysed but requires by far the largest share of the total investment. This is because intervention would be necessary in a large area of the country (4.2 million ha were taken into consideration), there would be high unit investment costs (US\$1,470/ha) and the investment cost per ton of CO₂-eq. mitigated would be the highest.

Moving to renewable energy systems and solar and wind-power technologies for water pumps, and to solar water heaters to provide hot water for on-farm or food industry operations such as cleaning/sanitation and/or pasteurization in food processing, would potentially support the sector to decrease CO₂ emissions.

While some developments have occurred, such as the development of drip irrigation, the production of biogas and the construction of small dams (with higher investment costs per ton of CO₂-eq.), and the

⁴⁷⁵ <http://documents1.worldbank.org/curated/en/354631468279277432/pdf/AB57960PIDOREV1IC10fix0report0title.pdf>.

intensification of milk production (via high lactation cows with improved diets, based on irrigated crops) and drip irrigation, these bring lower mitigation potential.

In the Moroccan context, conservation agriculture⁴⁷⁶ is one of the best options to reduce GHG emissions and it also shows other benefits. For instance, in 2018–2019, 3.6 million ha of cereals are cultivated in Morocco; however, only some thousands of hectares are cultivated under the no-till method, which is also economically less costly.

Agricultural insurance

Comprehensive weather insurance has evolved from a guarantee system prior to the PMV to an insurance product managed and marketed by a private insurance campaign (MAMDA⁴⁷⁷). It is of great importance in a context of climatic variability because of its contribution to the resilience of farmers in the face of climatic hazards (drought, excess water, hail, frost, strong winds and sandstorms, high temperatures). Within this framework, two insurance products have been put in place:

- Climatic multi-risk insurance for cereals, pulses and oilseeds, created in 2011 for cereals and pulses and extended since the 2014–2015 campaign to oilseeds. This insurance has covered areas ranging from 327,000 ha in 2011–2012 to more than one million ha as of 2016;
- Multi-risk climatic insurance for fruit growing, introduced in 2014, which aims to insure an annual area of 50,000 ha of fruit growing by 2020.

16.4 Legal, policy and institutional framework

Legal framework

The 1997 Dahir No. 1-97-01 promulgating Law No. 42-95 regulates the control and organization of trade in pesticides for agricultural use. Only companies approved for the manufacture or import of these products can market pesticides for agricultural use after their approval by the ONSSA following the opinion of the Interministerial Commission on Pesticides for Agricultural Use. According to the Dahir, simple industrial products that may be used as fertilizers or pesticides in agriculture (copper sulphate, sulfuric acid, quicklime, sodium chlorate) are not subject to approval. These products are currently permitted in organic farming.

The 2008 Decree No. 2-07-253 specifies that waste should be inventoried and classified according to its nature and origin in a Moroccan Waste Catalogue. It also specifies the bases on which hazardous waste is classified.

Law No. 28-00 defines agricultural waste as any organic waste generated by agricultural livestock or gardening activities; biodegradable agricultural waste can be recycled or disposed of on farms that produce it.

The 2010 Law No. 22-07 on Protected Areas regulates the layout and the management of protected areas. In natural parks, human activities such as farming, grazing and forest exploitation are authorized as long as they have no negative impact on the protected areas. Users' rights are maintained for the local population.

Dahir No. 1335 of 10 October 1917 regulates forest use and, in particular, the extent of rangeland within the forest domain. The forest service specifies the number and the kinds of grazing animals permitted to be on that land. The owners of animals in excess of that number, or of animals grazing in non-authorized areas, are to be fined.

The 1969 Dahir No. 1-69-170 and the 1992 Law No. 12-90 on Urban Planning, which protects agricultural lands and forests against building, regulate soil protection and rehabilitation. Adopted in different contexts and for considerations specific to them on environment, the 2003 Law No 11-03 on the Protection and Conservation of the Environment and the Framework Law No. 99-12 which was published following the adoption of the National Charter for the Environment and Sustainable Development in 2014 include general environmental obligations in terms of soil protection and rational use.

The 1998 Decree No. 2-97-487 setting out the conditions for water withdrawal stated that water withdrawal points established before 1995 had to be declared to the ABHs within a year. However, many users did not obey this decree. As a result, the deadline was extended a few times. The last deadline was in 2009, and wells drilled after this date were considered illegal. In the meantime, more wells were drilled with a potential for legalization. The farmer bears the cost of declaration and installation of a water meter and must then pay the water bill.

⁴⁷⁶ This sustainable farming method is based on three principles: crop diversification, minimal soil movement and permanent soil cover.

⁴⁷⁷ www.mamda-mcma.ma/fr.

The 1998 Decree No. 2-97-657 fixes the conditions for setting water protection, conservation and prohibition zones to protect water from pollution, including agricultural pollution.

The 2013 Law No. 39-12 on the Organic Production of Agricultural and Aquatic Products regulates the chain of organic production. It also contains the rules of control, specification, certification and labelling of organic products and sets out the role of the National Commission on Organic Production. Decree No. 2-13-358 of 10 March 2014 sets out the composition and operating mode of the National Commission for Organic Production. Decree No. 2-13-359 of 10 March 2014 sets out the conditions for certification and accreditation of organic production and establishes the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests as the competent authority for the specification and accreditation of certifying companies. Derogations for crop production (decree No. 271-15) and for animal production (decree No. 2986-17) are possible mainly over the duration of the conversion period. Furthermore, since the adoption in 2008 of Law No. 25-06 on Protected Geographical Indication (PGI), 62 products have been labelled, benefiting 720 cooperatives and 20,000 members with a turnover of 80 billion dirhams.

Morocco is rich in specific local products: this potential has been addressed with a variety of labelled products specifying their origin and quality. These include meat with the PGI “Lamb meat Beni-Guil”, a breed raised on the Oriental plateau, and fresh cheese, “Goat’s cheese of Chefchaouen”).

No national biosafety framework is in place to control the use of pesticide-resistant seeds. However, as a precautionary measure, the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests has indicated that it does not authorize the introduction into Morocco of seeds and plants from transgenic varieties, and that food products and preparations containing genetically modified organisms (GMOs) are prohibited for human consumption.

Land consolidation projects, reforestation of more than 100 ha and conversion of waste land or semi-natural surfaces into intensive agriculture are submitted for environmental impact assessment (EIA). The 2003 Law No. 12-03 on EIA does not include irrigation projects or large animal farms in its appendix.

The 2015 Decree No. 2-14-782 sets out the structure and functioning of the Environmental Police, who are

in charge of the application of the environmental laws and decrees (chapters 1 and 2). Members of the Environmental Police are trained in environmental protection measures and can inspect, investigate and interrogate potential offenders. The list of infringements and their sanctions are included in the various laws.

According to Law No. 12-03, land rights are accessible equally to men and women, but in the customary law applicable on *soulaliyates* (collectively held land), women do not enjoy use rights. To correct this situation and to support the achievement of SDG target 5.a, the 2019 Law No. 62-17 on Administrative Supervision and Management of Communal Land, as well as its implementing Decree No. 2-19-973, enables women to access the use of the land. Women are targeted in the former PMV and in Generation Green 2020–2030 in order to enhance their capacities in the agricultural sector. The production of argan oil is the prime example of a very successful development to promote women’s work and women’s cooperatives by giving women the opportunity to earn their living, contribute financially to the household at a substantive level and promote the marketing of their products.

Policy framework

Green Morocco Plan

To boost the modernization and upgrading of the agricultural sector, the PMV strategy was launched in 2008 with the aim of making agriculture a driving force for economic and social development and a provider of employment by 2020. The PMV was based on two pillars: solidarity-based agriculture (Pillar II), which focuses on improving the agricultural income of small farmers and combating insecurity, and modern agriculture with high added value (Pillar I), which is capable of competing in an era of globalization. The strategy adopted two approaches to develop the agricultural sector: a project approach and a sectoral approach, as well as improving the “doing business” framework and cross-cutting measures.

During the period 2008–2020, nearly 3,000 agricultural development projects were launched. Pillar II involved 989 projects for an investment of nearly 14.5 billion dirhams for the benefit of 730,000 beneficiaries. The PMV was also able to mobilize a total investment of 132.4 billion dirhams during that period, 41 per cent of which was public investment and 59 per cent private investment, mainly for productive infrastructure and support for solidarity-based agriculture.

The subsidized shift to drip irrigation since 2008 has brought a substantial economic benefit and a shift to cash crops and higher water productivity in general. By 2030, the added value generated per m³ water used is expected to increase by something like 80 per cent. The expected result is increased production and more jobs per m³ rather than a reduction in water consumption.

Morocco has undertaken measures that would contribute to the achievement of SDG targets 2.3, 2.a and 5.a by smallholders, including women and young people.

Thanks to the implementation of the PMV, agricultural GDP increased from 77 billion dirhams in 2008 to 125.4 billion dirhams in 2018, with an annual rate of growth of 5.25 per cent. In the rural sector, agricultural GDP per capita improved by 66 per cent between 2008 and 2018 and by more than 20 per cent between 2016 and 2018, supporting the achievement of SDG target 8.2 via agriculture. Agricultural exports increased from 15 billion dirhams to 33 billion dirhams in the same period. Animal husbandry accounts for 37 per cent of the added value of the sector in the period 2015–2018.

Morocco has set measures and objectives with a view to achieving SDG target 6.4. Under the PMV, at the end of 2016, irrigation programmes were deployed over 750,000 ha for the benefit of 220,000 farming enterprises, with an investment of 31.6 billion dirhams. Around 600,000 ha were re-equipped with water-saving irrigation systems (covering 35.5 per cent of the irrigated surface), so that 2 billion m³ water could be saved. Furthermore, another 82,280 ha were opened to irrigation downstream of the dams.

Recommendation 13.1 of the first EPR urged the then Ministry of Agriculture and Maritime Fisheries, in cooperation with the relevant authorities, to perform an interim assessment of the plans and projects under the umbrella of the PMV and present the conclusions to the Government, focusing on the environmental benefits of increasing the consolidation and overall security of land tenure of agricultural producers and support for the use of sustainable agricultural techniques assisted by intensified extension service. A mid-term evaluation of the PMV was carried out by the Department of Agriculture in 2014 and another in 2018. This recommendation was implemented.

Generation Green 2020–2030

In February 2020, the Department of Agriculture launched a new strategy for the development of the agricultural sector, Generation Green 2020–2030. This

strategy sets the main orientations and development axes of the agricultural sector for the 10 years to 2030 while consolidating the achievements of the PMV and focusing on the areas of improvement that have emerged from evaluation of the PMV in consultation with the relevant professions and the regions. Generation Green aims to make Moroccan agriculture more efficient by 2030 by doubling agricultural GDP to reach 200 billion–250 billion dirhams and the value of exports to reach 50 billion–60 billion dirhams annually, and by creating more than 350,000 new jobs while improving the living conditions of farmers.

This strategy is based on two main foundations: (i) prioritization of the human element; and (ii) continuation of the development dynamics of the agricultural sector. Through the first, the strategy aims to bring about the emergence of a new agricultural middle class of 350,000 to 400,000 new households and to stabilize nearly 690,000 households within this class, and to bring about the emergence of a new generation of young farmers (180,000) through the mobilization and development of one million hectares of collective land and the creation of 170,000 jobs in agricultural services and processing. Through the second, the strategy focuses on the development and consolidation of agricultural sectors, the structuring and modernization of distribution chains, the promotion of quality, innovation and green technologies, and the development of sustainable agriculture resilient to climate change.

National Strategy for the Development of Oasis and Argan Zones

The 2013 National Strategy for the Development of Oasis and Argan Zones promotes inclusive development, considering not only economics but also all other aspects, including the environment. Furthermore, to address the problems encountered by isolated rural and mountain populations, the State delivered programmes to promote access to drinking water (chapter 9), electricity (chapter 15) and roads.

Agricultural biodiversity

The NBSAP includes the sustainable use of biological resources with a view to improving the living conditions of the population concerned. The NBSAP plans to conserve the genetic diversity of local cultivars and animal breeds, and to institute in situ and ex situ programmes: a strategy for the conservation and development of genetic resources of cultivated plants and the enhancement of access to and sharing of benefits from the use of genetic resources.

Gender roles shape the way biodiversity is managed.⁴⁷⁸ In Morocco, biodiversity conservation is extremely important for women, especially for those living in the rural parts of the country as many of them rely on agriculture for their income. An approach through the gender lens to counter the increasing threats caused by climate change on biodiversity could be beneficial. As women hold traditional knowledge and practices, they have a fundamental role to play in looking after the heritage of the country, especially in the conservation of the MAPs and the management of the protected areas.⁴⁷⁹

In February 2021, the gender unit of the Department of Sustainable Development highlighted that the regulations for managing MAPs and their revenues were still lacking. The unit noted that better regulations would have a positive impact on women's incomes as they would draw more revenue from the production of MAPs. The second pillar of the PMV aimed, among other matters, to promote women's involvement in agriculture. While important progress has been made, challenges, such as land rights and

participation in the decision-making processes, remain for women workers.⁴⁸⁰

Combining biodiversity conservation with women's contribution and knowledge can create positive synergies. The Afoulki Cooperative, with 200 collaborators, works towards argan tree conservation. Production methods based on traditional knowledge contribute to the production of sustainable argan-derived products and secure decent working conditions for the workers.⁴⁸¹ In northern Morocco, where some plants are threatened due to climate pressure, a collaborative project between UNDP's Small Grants Programme and the Moroccan Association for the Development of Aromatic and Medicinal Plants guarantees the safety of these plants and empowers women who are cultivating them. Through training, women have developed an inventory of threatened plants and the means to manage their cultivation in a sustainable way, securing better incomes and gaining participatory power at the local political level.⁴⁸²

Photo 16.5: Saharan wadi, Khenifiss National Park



Photo credit: Department of Sustainable Development

⁴⁷⁸ www.cbd.int/gender/.

⁴⁷⁹ Montanari, B. and Bergh, S.I. Why women's traditional knowledge matters in the production processes of natural product development: The case of the Green Morocco Plan, *Women's Studies International Forum*, vol. 77(2019).

⁴⁸⁰ Montanari, B. and Bergh, S.I. A Gendered Analysis of the Income Generating Activities under the Green Morocco Plan: Who Profits? *Human Ecology* vol. 47 (2019). <https://doi.org/10.1007/s10745-019-00086-8>.

⁴⁸¹ www.cooperativeafoulki.net/a-propos/.

⁴⁸² www.undp.org/publications/women-environmental-stewards-experience-small-grants-programme.

Examples like this show how women have been empowered both economically and socially while they are ensuring the preservation of biodiversity. However, in general, the strategies, programmes or policies targeting biodiversity do not explicitly include the gender dimension.

Forests

The decennial programme (2005–2014) developed by the then High Commission for Water, Forestry and the Fight Against Desertification foresaw measures to prevent the impacts of climate change and the loss of forest areas. Some measures included the creation of 120 pasture users' cooperatives and compensating them (250 dirhams/ha/year) for the ban on grazing on 200,000 ha of land. In the field of research, Saharan species were introduced in the marginal zones of argan trees as well as tree ecotypes with high adaptation potential. Payment for ecosystem services was envisaged and an extension programme on energy saving and on good practices in forest use was put in place.

Grazing management

Since 2002, improved pasture management measures have been put in place by the Moroccan Livestock and Pasture Development Project in the Oriental region, financed by the International Fund for Agricultural Development (IFAD) and the 2014 National Programme for the Development of Rangelands and the Regulation of Transhumant Flows. The measures were mostly implemented in the Oriental and Guelmim es Semara areas (400,000 ha, 700,000 heads, 2 per cent of the country's herd were targeted). More recently, the promotion of those practices on a larger scale has been programmed in the PANLCD. About 70 per cent of the small ruminants are involved in the programme.

The National Programme for the Development of Rangelands and the Regulation of Transhumant Flows, launched by Department of Agriculture in 2014, aims to strengthen the development of pastures through the development of pastoral areas, by:

- Planting fodder shrubs and the creation of pastoral areas;
- Creating and equipping water points;
- opening up the transhumant population by opening routes;
- Improving the conditions of access to basic health and education services;
- Developing and enhancing the production chain associated with pastures, as well as the organization of stockbreeders, in particular

transhumant herders, and the strengthening of their professional capacities.

Of the eight types of pasture management established by the PANLCD, four were targeted for improvement measures. These include fencing and the planting of shrubs, pasture melioration with resowing, the establishment of rotational grazing and the (re)introduction of grazing bans, and thus compensatory payments to herders. But the application of these measures seems out of reach for such a large area. In 2011, for instance, of 42,988 ha of melioration projects in forests, only 5,270 ha were concerned with range melioration and 1,803 ha were put under grazing prohibition.

Soil

In response to the UNCCD strategy to save fertile lands, the PANLCD is being revised, with the definition of eight homogeneous zones with specific indicators for each. The aim is, by 2030, to reduce the water erosion of 6 million ha, to fight against the silting of up to 20,000 ha threatened by wind erosion and to reduce grazing pressure on 6 million ha by range melioration.

Recommendation 13.2 of the first EPR urged the then Ministry of Agriculture and Maritime Fisheries to define and implement a national agricultural soil protection strategy focusing on environmentally friendly farming methods protecting soil, saving water, promoting adaptation to climate change and capable of coproducing food, fodder and energy biomass. This recommendation was implemented. As at February 2021, the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, in cooperation with governmental institutions and NGOs, is drafting a strategy to protect agricultural soils. Also, the Department of Agriculture has set up a project for the establishment of soil use maps. This project aims to map the potential of Morocco's agricultural soils to support the sustainability of multiple production systems, under the different agroecological conditions of the Moroccan UAA and for different current and future climate scenarios. It is expected to map the suitability of agricultural soils for a range of crops and to develop a geographical database of agricultural soil potential. Up to 2020, soil potential maps and databases had been produced for more than 7 million ha of the *bour* UAA. A study of the impact of climate change on soil potential is under way, as are maps and databases of soil potential for irrigated UAA.

Gender and agriculture

Agriculture is an important sector for women's income generation. About 52.12 per cent of Moroccan women were employed in the sector in 2019.⁴⁸³ Due to climate change, higher temperatures, desertification, scarcity of water and extreme climatic episodes such as droughts or floods are expected. These increasing environmental pressures alter and threaten working conditions, often affecting women more than men.⁴⁸⁴

The CNEDD and the 2017 SNDD aim to express and achieve the country's commitment to react to climate change and guide its main actions. These texts include the notion of equal rights but omit explicit mention of gender. Specific indicators are also lacking. Women in agricultural production were precisely targeted in the PMV II, with the aim to integrate them more into the value chains. Generation Green 2020–2030 aims to overcome the barriers that women may face by securing their land and property rights, and to improve their access to financing, training and education. It also aims to develop women's working conditions and advance their representation in decision-making processes. The 2019 Law No. 62-17 is expected to guarantee better land management and improve gender equality.

Programmes implemented by international organizations and the Government enable women to benefit economically and increase their resilience to climate change. For example, UN Women in Morocco integrate climate change into their economic empowering programmes targeting agriculture. Their objectives are to improve conditions of women's labour by facilitating proper land rights and better access to financial means, information, resources and markets.⁴⁸⁵ Through these programmes, women's resilience facing natural climatic hazards is strengthened. Positive outcomes have already emerged with the access to training. Workers have gained management skills and knowledge about threatened plants and seeds, among other things. Other projects focused on MAPs conservation and job creation, and trained women, provided them with better management tools and contributed to the use of more efficient technologies. The projects have had

positive results, both economically and environmentally. When women realized that MAPs were more profitable than other crops, they were able to increase their productivity and income while ensuring sustainable production and protecting biodiversity. In addition, the women involved were able to open bank accounts and an economic interest group was created, providing better access to markets.

The project on the development of agricultural sectors in mountainous areas of Al Haouz Province, under the PMV, while not explicitly geared towards climate change, allowed the development of tools to increase resilience and manage workers' financial risks. It also helped improve women's inclusion in value chains.⁴⁸⁶ The Taza Mountain Integrated Rural Development Project for the pre-Rif region, which will run from 2019 to 2026, puts more emphasis on climate change. It aims to achieve a reduction in poverty and vulnerability for the agricultural population of the region, including women.⁴⁸⁷

The project entitled Economic Empowerment of Women in Morocco's Argan Sector (REFAM), co-financed by the Canadian Agency "Global Affairs Canada" and ANDZOA, aims at the economic empowerment of women in the argan sector of the RBA.⁴⁸⁸ It includes targeted interventions at the levels of: (i) institutional strengthening of FIFARGANE and inter-professional actors, including training and support for women's cooperatives; (ii) increased market access through better knowledge of needs and more targeted innovative marketing of argan products; and (iii) reduction of gaps in women's representation at all levels of the sector.

The inclusion of women in agriculture and climate change issues is crucial. Morocco has taken important steps through the PMV and Generation Green 2020–2030. However, according to "The collection of good practice on gender, environment and sustainable development",⁴⁸⁹ not enough women participate in discussions and land rights are still an issue. The department in charge of climate change set the objective to continue promoting better gender representation in the decision-making process and is looking to explicitly add gender to the strategic plans

⁴⁸³ <https://ilostat.ilo.org/>.

⁴⁸⁴ <https://unfccc.int/gender>.

⁴⁸⁵ www2.unwomen.org/-

</media/field%20office%20morocco/documents/others/fiches%20projets%202017/fiche%20programme%20agriculture%20Resiliente%20finale.pdf?la=fr&vs=3802>.

⁴⁸⁶ www.ifad.org/documents/38714182/41729064/PCR_V_Morocco_1100001526.pdf.

⁴⁸⁷ <https://webapps.ifad.org/members/lapse-of-time/docs/english/EB-2019-LOT-P-3.pdf?attach=1>.

⁴⁸⁸ www.cowater.com/en/project/renforcement-economique-des-femmes-de-la-filiere-arganiere-au-maroc-refam-2/.

⁴⁸⁹ Recueil des bonnes pratiques genre, environnement et développement durable, Secrétaire d'Etat Chargé du Développement Durable.

to ensure the better integration of women in the different governmental programmes and strategies.

According to evaluation of the 2017 Heinrich Böll Foundation project, “Women in the Oases and Climate Change”, which included participative consultation in central Morocco, there are challenges in the nexus between climate change, oases and women. Standard projects, which support the preservation of oases, show important benefits but do not include a gender perspective. Women do not participate in the decision-making processes and their knowledge of preservation and biodiversity is less considered. However, the study highlighted that increasing the associative movement helps women to contribute more in the realization of projects and to participate in local decision-making.⁴⁹⁰

Right to food

The 2011 Constitution mentions the right to life, from which the right to adequate food is implied. However, there is no mention of the word “food” or the right to food. However, Moroccan authorities face the challenge of putting into practice the country’s robust commitment to address poverty and food insecurity on its territory. In 2001, 15.3 per cent of the population lived in poverty and 22.8 per cent were classified as vulnerable; by 2013, these figures had fallen to 6.2 per cent and 13.3 per cent, so that malnutrition is now at the level of 4.9 per cent and hunger at 0.5 per cent of the population. More recently, under the SDG commitments, Morocco has made important progress in the fight against hunger. Thanks to an increase in food per capita, the prevalence of undernourishment decreased considerably overall in the period 2007–2014, from 0.9 per cent to 0.1 per cent. To achieve these improvements, the country launched two programmes. The National Nutrition Strategy (2011–2019) targeted accessibility in terms of quantity and quality of food for the population by increasing the agricultural capacity of smallholders. The National Nutrition Programme, launched in 2019 under the frame of that Strategy, focuses on improving indicators to ensure efficient monitoring to prevent nutrition problems. Despite these achievements, challenges remain, especially in terms of social, spatial and gender disparities, but the country demonstrates active commitment to these issues.

In addition, the improvement in food availability is also a consequence of the efforts undertaken under the PMV to ensure the country’s food security. The PMV has worked to promote investment in and upgrade the agricultural sector in order to improve agricultural

productivity and thereby ensure increased incomes for farmers and a steady supply of agricultural products. Among the programmes launched within the framework of the PMV aimed at improving agricultural production, mention should be made of Pillar I and II projects, sector programme contracts, agricultural aggregation, irrigation modernization programmes, agropoles, food quality and safety guarantee programmes and the conclusion of a programme contract for the development of the agrifood industry. These efforts have contributed to:

- An improvement in per capita production between 2008 and 2018 for most agricultural sectors: +86 per cent for cereals, +15 per cent for fruit and vegetables, +23 per cent for sugar, +31 per cent for red meat, +43 per cent for white meat and +23 per cent for milk;
- A guaranteed good level of coverage for several food products, notably: fruit and vegetables (100 per cent), animal products (milk and meat) (98–100 per cent), cereals (60–70 per cent) and sugar (47 per cent);
- Relative stability of the Consumer Price Index for foodstuffs, despite the increase in the price of these products on the world market.

In the 2020 Global Hunger Index (GHI), Morocco ranks 44th of the 107 countries with sufficient data to calculate 2020 GHI scores. With a score of 8.9, Morocco has a level of hunger that is low. In 2006, Morocco score was 17.5, which was considered moderate.

SDG target 2.1 is partially integrated into the SNDD.

Institutional framework

Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests

The adoption of the PMV in 2008 necessitated institutional reform of the agricultural sector to support the implementation of the strategy, notably through the creation of the ADA, the establishment of 12 Regional Directorates of Agriculture and their local representations (Provincial Directorates of Agriculture and Regional Offices of Agricultural Development in irrigated areas) as well as the National Office of Agricultural Advice, the ANDZOA and the ONSSA. The ORMVAs encourage environmental protection and the matching of crops to farms, while emphasising water-saving irrigation techniques such as supplemental irrigation.

⁴⁹⁰ https://ma.boell.org/sites/default/files/femmes_oasiennes_et_changement_climatique_au_maroc.pdf.

The creation of ONSSA is a significant step forward in the country's institutional framework. The limited financial and human resources of ONSSA, as well as its limited legal powers (intervention into other ministerial departments, closure of non-compliant agro-industrial establishments, collective catering), do not allow it to guarantee the health and safety of the country's food.

Recommendation 13.3 of the first EPR recommended that the Government give the status of autonomous agency to ONSSA, to place it under the authority of the Head of Government, and secure and sustain its human and financial resources. This recommendation has been addressed in the 2019 annual report of the Economic, Social and Environmental Council and Morocco advises that its implementation is under way.

INRA manages a centre of agricultural diversity in Settat, with a gene bank (collection of cultivars and wild relatives, mainly wheat, barley, maize) and a planted collection of perennial plants (fruit and olive trees, palm). At Tessaout, INRA also holds the largest collection of olive trees in the Mediterranean basin.

Between 2012 and 2020, ANDOZA signed 792 partnership agreements with local development actors (e.g., local authorities and NGOs) in the amount of 1.58 billion dirhams, of which 560 million dirhams was provided by ANDZOA, i.e., a leverage rate of 65 per cent.

Other institutions

There are a number of other state agencies, such as the Social Development Agency (ADS), which works with small farmers to develop and diversify their businesses, with the help of diverse foreign donors.

Other private environmental initiatives

In 2008, the Moroccan Association for the Geographical Indication of Argan Oil (AMIGHA) was created, which gathered together all the actors in the argan sector to ensure the protected geographical indication of the product according to Law No. 25-06. The Interprofessional Federation of the Argan Sector (FIFARGANE) replaced the Moroccan Interprofessional Federation of the Argan Industry (FIMARGANE) in 2019 and defends the labelling of argan oil and all its derivatives. It plans to rehabilitate 200,000 ha of argan groves and expects to increase oil production from 4,000 tons in 2014 to 10,000 tons in 2020. The programme is estimated to cost 2.81 billion dirhams, of which 80 per cent is from the State budget.

Éléphant Vert Maroc,⁴⁹¹ started in Meknès at the end of 2013 or early 2014 to produce biogas from locally sourced cattle manure and vegetable waste and to manufacture organic pesticides and organic fertilizers. Biogas production is facing significant problems in transporting the raw material, however, which limits its viability on a large scale.

Projects related to agriculture

Pesticides

A four-year project was launched by ONSSA, FAO, CropLife International and other departmental partners in 2015 (GCP/MOR/041/GFF), and extended in 2019, to eliminate obsolete pesticide stocks, including POPs, and implement integrated pest management programmes. It also aims to prevent new stockpiles and manage empty packaging. The project also aims to strengthen institutional and technical capacities for registration and post-registration systems and to promote alternatives to reduce the use of conventional chemical pesticides.

Alternative and rational plant protection measures will be promoted: a pilot network of farmers in the Souss-Massa region will be established, with the mission of disseminating alternative technologies through appropriate training initiatives.

Local breeds

The National Sheep and Goat Association works on the conservation and melioration of the local breeds, and the local branch of "Terre et Humanisme" works on the conservation and promotion of the rich reservoir of local plant varieties with its "Project Femmes Semencières", which recognizes the key role of the women in this sector.

16.5 Assessment, conclusions and recommendations

Assessment

Agriculture plays an important role in Morocco, providing the largest employment sector in the country, accounting for 13 per cent of GDP, on average, and securing food self-sufficiency in many areas. Agricultural production has been intensified over the years to account for a growing population and its own increasing economic importance. However, this sector is vulnerable to several pressures, such as changes in the weather, including rainfall or a lack

⁴⁹¹ www.elephant-vert.com/maroc/.

thereof, soil salinization, water scarcity and air pollution.

One of the greatest pressures for Morocco's agricultural sector is water. Depleting groundwater tables, droughts, floods, water pollution, rising sea levels and seawater intrusion all have a drastic impact on agriculture and the well-being of local communities. This is compounded by Morocco's above-average sensitivity to climate change. Morocco has recognized the importance of climate change adaptation and mitigation measures and has put in place several plans, policies and warning systems to minimize the impact of climate change on the agricultural sector. From an economic perspective, the development of other economic sectors may mean that reliance on agriculture for economic growth will be less necessary. Nonetheless, it is clear that climate change will have a damaging environmental and social impact on the agricultural sector. The uncertainty that climate change poses will require stronger responses from the Government in continuing to adapt and mitigate the effects of climate change.

Alongside programmes to mitigate and adapt to climate change, other policies demonstrate Morocco's commitment to promoting and bolstering the agricultural sector. The PMV, in operation between 2008 and 2020, aimed to strengthen the agricultural and agrifood sectors, largely targeting poverty alleviation and the creation of an agricultural middle class. The two pillars of the PMV have been the target of some criticism, especially since environmental concerns were not fully implemented or considered. However, its successor strategy, Generation Green 2020–2030, appears to encompass a more holistic approach to improving the agricultural sector, including considerations of gender, sustainability, and climate-smart rural value chains. Through such strategies and many other policies in the agricultural sector, Morocco is working towards the implementation of several SDGs and the achievement of Agenda 2030.

Recommendations 13.1, 13.2 and 13.3 of the first EPR are implemented or on the way to being implemented.

Conclusions and recommendations

Environmental impact assessment

While land consolidation projects, reforestation of more than 100 ha and the conversion of waste land or semi-natural surfaces to intensive agriculture are subject to an EIA, EIAs are not mandatory for irrigation projects, nor for large animal farms. These projects could have impacts on water quality.

Recommendation 16.1:

The Government should ensure that expansion and modification of irrigation schemes and building large cattle units are subject to environmental impact assessments or environmental impact statements.

Agricultural soil protection

Agricultural soils are under pressures resulting from desertification and the intensification of agriculture. While there is a strategy to combat desertification, no strategy exists for the protection of agricultural lands that are not affected by desertification. The soil protection has no clear and visible objective, no coordination on the state level and among the actors at all levels of decision-making, nor with the local authorities and the local population who are opposing any measures. Laws and regulations are not enforced in the field and procedures are long and costly. As at February 2021, the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests, in cooperation with other governmental institutions and NGOs, is drafting a strategy to protect agricultural soils.

Recommendation 16.2:

The Government should pursue its efforts for soil protection, focusing on environmentally friendly farming methods protecting soil, saving water, promoting adaptation to climate change and capable of coproducing food, fodder and energy biomass.

Soil

Morocco has a long and rich agricultural tradition that farmers have developed over centuries of practices in agricultural land use and soil conservation, adapted to local conditions and water availability. The Department of Agriculture puts great effort into introducing new methods or combining methods. However, to be convincing, they must not only be more environmentally friendly but, above all, reduce work hardship and/or increase yields and profitability.

Knowledge and experience of improving grazing practices exists in Morocco. However, improved grazing practices have not been implemented on a large scale in the country and the existing knowledge and experience is not widespread among technicians and herders. Animal feeding is a balance on the farm level, where grazing is complemented with fodder crops introduced into the crop rotation, the distribution of by-products and weeds.

As for irrigation, there are numerous tips and tricks to save water and save the crop simultaneously. For instance, depletion irrigation of palm trees or a single

irrigation “shot” at the beginning of the growing season for wheat can ensure the yield with a low investment in water.

Recommendation 16.3:

The Government should:

- (a) *Continue granting financial incentives or rewards for farmers implementing good agricultural practices and, in particular, the bulk of methods of conservation agriculture, the maintenance of walls, embankments and terraces, and correct grazing management;*
- (b) *Promote precision agriculture in large farms.*

Water

Whereas the volume of run-off fell by 35 per cent in 30 years, public irrigation grows by 2.3 per cent per year. According to the PNE, water demand was estimated as 12.04 billion m³ in 2010 and 14.5 billion m³ in 2020. The demand is expected to increase, up to 16 billion m³ in 2050.

Groundwater resources – which provide almost 40 per cent of the total irrigated area and contribute to more than 50 per cent of the economic value added generated by all irrigated areas – are a particular concern. About 5 billion m³ are abstracted every year against a renewable potential of 3.4 billion–4 billion m³, with 1 million m³ of groundwater depletion each year. The figure of 441,430 ha of land irrigated by groundwater (2004) has not been updated and seems to be grossly underestimated. However, Morocco’s economic dependence on the irrigated agricultural sector will make measures reducing water use difficult to implement.

Recommendation 16.4:

The Government should ensure that:

- (a) *Water meters are installed at all farms in order to promote agricultural practices that are more water efficient;*
- (b) *Financial incentives or rewards are granted for farmers who wish to implement good agricultural practices with regard to water-saving practices, the use of rain-fed crops as much as possible and drought-resistant cereal varieties, and better combination of rain-fed and irrigated crops.*

Pesticides

The website of the Ministry of Agriculture, Marine Fisheries, Rural Development and Waters and Forests provides comprehensive information about types of pesticides. However, pesticide use levels are not available. Inadequate distribution, management and use of agrochemicals by farmers who do not have the level of training required to use dangerous chemicals is widespread.

Recommendation 16.5:

The Government should ensure that:

- (a) *The Law on plant protection products and the Law on fertilizers, their additives and growing media, are implemented;*
- (b) *Continuous training on the use of pesticides is provided to persons in charge of pesticides treatment, and to farmers, including independent farmers grouped in cooperatives, and members of cooperatives.*

ANNEXES

*Annex I: Status of implementation of recommendations
of the first EPR of Morocco*

*Annex II: Highlights of SDG targets addressed in
the second EPR of Morocco*

*Annex III: Participation of Morocco
in multilateral environment agreements*






Annex IV: List of major environment-related legislation






Annex V: Sources






Annex I

Status of implementation of recommendations of the first EPR of Morocco

The table below presents an overview of the status in implementing the recommendations of the first EPR of Morocco (2014). A detailed assessment of the status of their implementation is integrated in relevant chapters.

						
Rec. No.	Not implemented	Partially implemented	In progress/ Ongoing	Implemented	Still relevant to be implemented	Pages
1.1 (a)	√					32
1.1 (b)				√		41
1.1 (c)				√		34
1.1 (d)			√			38
1.2 (a)				√		20
1.2 (b)				√		28
1.3		√				16, 26
1.4		√				16
2.1 (a)		√			√	43
2.1 (b)		√				43
2.1 (c)		√			√	43
2.1 (d)		√			√	43
2.2 (a)		√				61, 64
2.2 (b)		√				61, 64
2.2 (c)	√					61, 64
2.2 (d)	√					61, 64
2.3 (a)		√			√	57, 64
2.3 (b)	√					57, 64
2.3 (c)		√				57, 64
2.3 (d)		√				57, 64
2.3 (e)	√					57, 64
2.4 (a)			√			59, 64
2.4 (b)	√					59, 64
2.4 (c)	√					59, 64
2.4 (d)	√					59, 64
2.4 (e)	√				√	59, 64
3.1			√			105
3.2 (a)		√				105, 110
3.2 (b)		√				105, 110
3.2 (c)		√			√	105, 110
3.2 (d)			√			103, 110
3.3				√		123, 129
3.4	√				√	147, 155
4.1 (a)	√					78, 92
4.1 (b)	√					78, 92
4.1 (c)	√					78, 92
4.2 (a)		√				92
4.2 (b)	√					92
4.2 (c)	√					92
4.3 (a)		√				77, 92

						
Rec. No.	Not implemented	Partially implemented	In progress/ Ongoing	Implemented	Still relevant to be implemented	Pages
4.3 (b)	√					77, 92
4.4				√		45
4.5 (a)				√		92
4.5 (b)				√		92
5.1			√			159, 182
5.2 (a)	√				√	162, 182
5.2 (b)	√					129, 182
5.3			√			159, 182
6.1 (a)				√		190, 193, 196
6.1 (b)				√		190, 193, 196
6.2 (a)		√				191, 196
6.2 (b)		√			√	191, 196
6.3			√			191, 196
7.1 (a)				√		209, 216
7.1 (b)				√		209, 216
7.1 (c)				√		209, 216
7.1 (d)				√		209, 216
7.2 (a)				√		210, 212, 216
7.2 (b)			√			210, 212, 216
7.2 (c)	√					212, 215, 218
7.3 (a)			√			209, 213, 216
7.3 (b)			√			209, 213, 216
7.3 (c)			√			209, 213, 216
7.3 (d)			√			209, 213, 216
7.3 (e)			√			209, 213, 216
7.4 (a)			√			213, 216
7.4 (b)			√			213, 216
7.4 (c)			√			213, 216
7.4 (d)			√			213, 216
7.4 (e)			√			213, 216
8.1			√			233
8.2	√					219
8.3		√			√	221
8.4	√				√	221
8.5 (a)	√				√	221
8.5 (b)	√				√	221
8.6 (a)		√			√	227
8.6 (b)		√			√	227
8.7 (a)				√		234
8.7 (b)			√			234
8.7 (c)				√		234
8.7 (d)				√		234
8.7 (e)		√				234

						
Rec. No.	Not implemented	Partially implemented	In progress/ Ongoing	Implemented	Still relevant to be implemented	Pages
9.1		√				247, 252, 258
9.2 (a)		√				250, 258
9.2 (b)		√				250, 258
9.3 (a)			√			253, 258
9.3 (b)			√		√	253, 258
9.4				√		255, 258
9.5	√					252, 258
10.1	√					330
10.2	√					330
10.3				√		329
10.4	√					329
10.5	√					307
10.6			√			329
10.7	√					329
10.8 (a)		√				329
10.8 (b)		√				329
10.9		√				321, 329
10.10				√		327
11.1 (a)		√				340
11.1 (b)		√				340
11.2		√				345, 352
11.3 (a)		√				352
11.3 (b)		√				352
11.4	√					351, 352
11.5 (a)	√					347
11.5 (b)			√		√	347
12.1	√					365, 369
12.2 (a)				√		365, 369
12.2 (b)				√		365, 369
12.3 (a)			√			365, 369
12.3 (b)			√			365, 369
13.1				√		386, 392
13.2				√		388, 392
13.3 (a)			√			391, 392
13.3 (b)			√			391, 392
13.3 (c)			√			391, 392
119	32	33	29	25	18	
100%	27%	28%	24%	21%	15%	

The first EPR of Morocco made 60 recommendations comprising of 119 sub-recommendations, of which 58 were implemented or partially implemented (49 per cent), 28 are in progress of being implemented (23 per cent) and 33 were not implemented (28 per cent). The country has an implementation rate (recommendations implemented, partially implemented or in progress) of 72 per cent.

Of the 119 sub-recommendations, 18 are still relevant for the country to pursue their implementation.

Annex II

Highlights of SDG targets addressed in the second EPR of Morocco

The second EPR of Morocco includes an assessment of 93 SDG targets, including targets being reviewed in several chapters from different perspectives. In some cases, a comprehensive analysis of SDGs and targets is hindered by the lack of data and information.

Concerning SDG indicator 1.4.1, in 2017, only 30.3 per cent of households had access to all basic services, which include tap drinking water, electricity, in-house toilet, connection to a public sewerage network and the disposal of household garbage in public neighbourhood containers or via a garbage collection service. The Mohammed VI Foundation for the Protection of the Environment projects include an educational and information component. The Programme helps reduce poverty (SDG target 1.4).

Morocco has progressed concerning the SDG indicator 1.5. In 2019, the number of people who died, were reported missing or were affected by natural disasters was 0.18 per 100,000 population, a total of 751 people directly affected by a natural disaster (SDG indicator 1.5.1). Also, according to the Sendai Framework Monitoring System, Morocco's score for adoption and implementation of national DRR strategies in line with the Sendai Framework shows a positive trend towards achieving the SDG indicator 1.5.3. However, a national strategy for integrated risk management is still lacking.

Concerning the elimination of hunger, SDG target 2.1 is partially integrated into the SNDD. Sustainable fishing and aquaculture and healthy marine ecosystems and habitats are essential for the food security and nutritional needs of coastal communities. However, a growth in farming productivity for food production may undermine efforts to reduce pollution from waste from agricultural inputs, such as pesticides and nutrients (SDGs 2). The Mohammed VI Foundation for the Protection of the Environment offers the possibility of healthy, thriving environments. The projects ensure that fishing practices are sustainable and productive, thus promoting food security within the country (SDG target 2.3).

With 72.6 maternal deaths per 100,000 live births reported in 2018, Morocco is nearing SDG target 3.1. The proportion of births attended by skilled health personnel (SDG indicator 3.1.2) augmented between 2010 and 2018. As regards SDG target 3.2, achieving the Moroccan national target of 12 deaths per thousand in 2030 would mean almost halving this rate. The same applies to the neonatal mortality rate.

The proportion of women of childbearing age, between 15 and 49 years, using modern family planning methods was 58 per cent in 2018, showing a slight increase on the 56.7 per cent recorded in 2010 (SDG indicator 3.7.1). The birth rate among adolescents aged 10–14 years and 15–19 years per 1,000 adolescents in the same age group was 32 births per 1,000 adolescents in 2010, dropping sharply to 19.4 births per 1,000 adolescents in 2018 (SDG indicator 3.7.2).

WHO declared Morocco to be free of malaria in 2010. SDG indicator 3.3.3 has therefore been attained in Morocco. However, principal vectors of malaria are still present in relatively large concentrations in almost all geographical areas of the country. Consequently, there is the fear the disease will re-emerge. Also, cases of viral hepatitis fell from 1 per 100,000 population in 2010, to 0.5 per 100,000 population in 2017 (SDG indicator 3.3.4).

Concerning drug addiction, Morocco has 15 centres devoted to treating addiction problems (SDG indicator 3.5.1). Other facilities in the form of walk-in centres are planned.

The road traffic accident mortality rate fell from 1.1 per 10,000 population in 2015 to 0.937 per 10,000 population in 2018 (SDG indicator 3.6.1). Although the national target of 0.55 by 2030 has not yet been achieved, Morocco hopes to reduce the number of road traffic deaths by 25 per cent by 2021 and 50 per cent by 2026.

Regarding SDG target 3.8 (achieve universal health coverage), coverage of essential health services (indicator 3.8.1) was still far short of the target of 100 per cent and therefore an ongoing major public health issue for the Moroccan population. In 2014, the percentage of the population devoting a proportion of their expenditure or household income to health-care services at a rate greater than 10 per cent of household expenses (national indicator 3.8.2 A) was 13.4 per cent. For 2 per cent of the population, the rate was more than 25 per cent of household expenses (national indicator 3.8.2 B).

The study "Health and Air Pollution, Sustainable Development Goal 3 in Morocco" reviews the extent to which SDG target 3.9 relating to ambient air pollution have been reached. SDG indicator 3.9.1 was estimated to be 53 deaths per 100,000 in

2010, and the rate was similar in 2016. A decrease to 47 deaths per 100,000 was forecast for 2020, and a rate of 35 deaths per 100,000 is projected by 2030.

The mortality rate standardized for 100,000 people based on age and attributable to unclean water, deficiencies in the sanitation system and a lack of hygiene in Morocco had halved in 10 years (SDG indicator 3.9.2). The Mohammed VI Foundation for the Protection of the Environment offers the possibility of healthy, thriving environments. The measures taken as part of the projects help prevent infections and diseases (SDG target 3.9).

The mortality rate attributable to unintentional poisoning (SDG indicator 3.9.3) is not high in Morocco and has decreased between 2010 and 2016, from 0.7 to 0.6 deaths per 10,000 population. Regarding the goals of Agenda 2030, the country does not report on SDG target 3.9. WHO data for indicator 3.9.1 are only available for 2016. It is thus impossible to assess progress. The present EPR recommends (recommendation 8.2) the Government to improve knowledge of the link between air pollution and respiratory diseases linked to pollution to stimulate the achievement of SDG target 3.9.

As regards tobacco consumption, the national survey of NCD risk factors conducted in 2017 revealed that 13.4 per cent of Moroccans aged 18 years and over smoked tobacco. Regarding the prevalence of current tobacco consumption among people aged 15 years and older, more than 11 per cent of Moroccans in this age bracket were consuming tobacco in 2018 (SDG indicator 3.a.1). The most recent studies appear to show a decline in the prevalence of smoking.

For SDG target 3.b, information is available for SDG indicator 3.b.1 only. The country is in a good position to achieve its target of 95 per cent in 2030. According to the HCP, the number of inhabitants per health professional dropped from 1,925 in 2013 to 1,383 in 2017 (SDG indicator 3.c.1). No information is supplied for SDG indicators 3.d.1 and 3.d.2.

At the initiative of the ministry in charge of education, Morocco has established the National Coordination Committee for SDG 4, operational since 2016. The Committee is mandated to coordinate activities to achieve SDG 4. Limited progress has been made since 2016. Concerning the nationalization of SDG 4 targets, the actions carried out by the ministry remain limited. At the same time, the country's Strategic Vision of Reform 2015–2030 is aligned with the 10 targets of SDG 4 and serves as a strategic framework for achieving SDG 4. At the legislative level, Framework Law No. 51-17 regulates the implementation process. The National Coordination Committee lacks a proper regulatory framework to enforce its mandate and therefore has limited powers, resulting in weak involvement in implementation activities and a narrow scope for its initiatives on SDG 4. Another weakness is the lack of capacity to support a continuing process of alignment, implementation, monitoring and assessment of SDG 4 targets.

During the period from 2015–2016 to 2017–2018, the participation rate of youth and adults (15–24 years old) in formal and non-formal education and training in the previous 12 months, by sex (SDG indicator 4.3.1) increased by 1.4 points. The participation rate of girls also increased. In Morocco, the primary education gender parity index improved slightly, but remains in favour of boys. The increase is more pronounced in secondary education: from 0.87 to 0.92 at college level and from 0.98 to 1.10 at qualifying level during the same period (SDG indicator 4.5.1). The decline in illiteracy in Morocco has been more pronounced among young people under 25 years old. However, the illiteracy rate for the adult population and the gap in rural/urban disparity remains considerable and it will not be able to reach target 4.6 and 4.6.1 by 2030.

Morocco has made good progress in setting conditions to reforming its education system and including ESD in the main national strategic document guiding sustainable development efforts; however, little progress in practical implementation of mainstreaming ESD into the formal education systems has been made. The Mohammed VI Foundation for the Protection of the Environment joined efforts made by the ministry in charge of education to integrate SDGs into the curricula for the last two years of primary education. A course on SDGs for college students is taught at the initiative of the Foundation in partnership with the ministry in charge of education. Without such training, the country would not be able to achieve SDG targets 4.7 by 2030. The present EPR recommends (Recommendation 6.7) to the High Commission for Planning to undertake assessments to ensure reporting in 2030 on the achievement of SDG target 4.7, by providing information on the extent to which global citizenship education, and education for sustainable development are mainstreamed in national education policies, curricula, teacher education and student assessment.

The second Plan contains measure 1.3.3 on strengthening the position of women in the value chains of agriculture, fish farming and the extractive and artisan sectors. If implemented, this measure would help Morocco achieve SDG 5 in relation to fishing. To support the achievement of SDG target 5.a, the 2019 Law No. 62-17 on Administrative Supervision and Management of Communal Land enables women to access the use of the land.

Concerning ensuring clean water and sanitation for all, there are some progresses. In the period 2012–2020, the proportion of the population using safely managed drinking water services increased from 67 per cent to 80 per cent, which represents a step towards SDG target 6.1. However, disparities still exist between urban and rural areas. Indeed, the proportion of the population using safely managed drinking water supply services reached 93 per cent in 2018 (SDG indicator 6.1.1), but more than one third of the rural population does not have access to good quality water that meets the standards in force.

The Mohammed VI Foundation for the Protection of the Environment offers the possibility of healthy, thriving environments. The projects ensure the supply of good quality water (SDG targets 6.2 and 6.3). SDG target 6.3 has shown positive progress. According to WHO, in 2020, the proportion of safely treated domestic wastewater flows was only 36.1 per cent. Data on the quality of water bodies reveal that, in 2017, 70 per cent of the surface water resources and 56 per cent of the groundwater resources were of good quality. These figures show that the country is far from meeting SDG target 6.3.

The proportion of wastewater flows safely treated (SDG indicator 6.3.1) increased from 25 per cent in 2016 to 55 per cent in 2019, which showed that the Government's effort to lessen water pollution was beginning to show positive results. In 2017, 70 per cent of the water bodies had good quality ambient water. Water-use efficiency (SDG indicator 6.4.1) was "medium", although it improved slightly since 2012. Further, the level of water stress (SDG indicator 6.4.2) remained stable; around 50.8 per cent between 2012 and 2017.

The country does not report on water-use efficiency. However, water-use efficiency was at US\$8.73 per m³ in 2018, compared with US\$7.54 per m³ in 2015, demonstrating an increase in efficiency (SDG indicator 6.4.1). In 2010, the proportion of freshwater withdrawal from available freshwater resources was 61 per cent. According to FAO, it was 50.75 per cent in 2018 (SDG indicator 6.4.2). The country is making progress toward the achievement of SDG target 6.4, 6.4.1 and 6.4.2.

Morocco has set measures and objectives with a view to achieving SDG target 6.4. Under the PMV, at the end of 2016, irrigation programmes were deployed over 750,000 ha for the benefit of 220,000 farming enterprises. 2 billion m³ water could be saved. Another 82,280 ha were opened to irrigation downstream of the dams.

Morocco has made progress in achieving SDG 6, especially SDG targets 6.1, 6.2, 6.4, 6.5 and 6.b. A large proportion of the population has access to safe drinking water and sanitation (targets 6.1 and 6.2). The country has also slightly increased its water-use efficiency (target 6.4). However, the country is still not on its way to reach several targets. There are still disparities between urban and rural populations in terms of access to safe drinking water, sanitation and hygiene (targets 6.1 and 6.2). The treatment of wastewater (target 6.3) and water-use efficiency (target 6.4) present low figures. The lack of data also hinders possibilities to assess the country's achievement with respect to several targets.

The country does not report on the level of implementation of integrated water resources management at all levels. The proportion of transboundary basins with an operational arrangement for water cooperation (SDG indicator 6.5.2) was 0 per cent in 2020. Nevertheless, figures from UNEP present an improvement: 63.9 per cent of transboundary basin areas had an operational arrangement for water cooperation in 2017 and 71 per cent in 2020. This progress indicates the country's recent efforts towards meeting SDG target 6.5. The annual amount of official development assistance for water supply and sanitation in the period 2012–2019 averaged US\$234.63 million at 2019 constant prices (SDG indicator 6.a.1).

The country does not report on SDG 6.6, which addresses the protection of water-related ecosystems.

Regarding SDG target 6.b on the participation of local communities in improving water and sanitation management, the country does not report data. However, the country is meeting the objectives. According to the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water in 2019, the level of participation was high, both in the planning process for rural drinking water supply and for water resources planning and management.

Challenges remain to ensure access to affordable, reliable, sustainable and modern energy for all (SDG 7). The 2009 National Energy Strategy defined a roadmap aimed at supporting the transition to a low-carbon energy system. It covers the areas of the electricity sector, renewable energy, energy efficiency, the fuel sector, electronuclear energy, oil exploration, oil shale and bioenergy. Implementation of short-, medium- and long-term action plans would contribute to the achievement of the SDG target 7.1. SDG target 7.2 has shown positive progress. To achieve SDG target 7.2, Morocco has a declared target of reaching over 52 per cent of installed electricity production capacity from renewable sources by 2030. The International Energy Agency estimated that Morocco will need to invest US\$30 billion to achieve this target.

According to the IEA, energy intensity measured in terms of primary energy and GDP (SDG indicator 7.3.1) decreased from 0.083 toe/US\$1,000 in 2012 to 0.077 toe/US\$1,000.

According to the OECD and the International Renewable Energy Agency, the total public international financial flows is fluctuating, with a peak in 2014 of almost US\$1.5 billion at 2018 prices and exchange rates (SDG indicator 7.a.1). In 2018, these flows to Morocco reached US\$836 million at 2018 prices and exchange rates.

To be able to reach SDG target 7.b, Morocco has decided to increase the share of clean energy in the electricity mix to 52 per cent by 2030. The installed renewable electricity-generating capacity (SDG indicator 7.b.1) increased from 48 W/capita in 2012 to 89.58 W/capita in 2019.

Coastal tourism occupies a fundamental place in developing sustainable tourism, generating jobs and promoting culture and local products (SDGs 8). SDG target 8.2 has shown a slow-down in progress. In the rural sector, agricultural GDP per capita improved by 66 per cent between 2008 and 2018 and by more than 20 per cent between 2016 and 2018, supporting the achievement of SDG target 8.2 via agriculture. The annual growth rate of real GDP per employed person (SDG indicator 8.2.1) dropped from 3.3 per cent in 2014 to 1.7 per cent in 2018. No data are available on target 8.3.

The Mohammed VI Foundation for the Protection of the Environment projects include an educational and information component. The Programme helps create fair employment by enabling local communities to take an active part in the projects (SDG targets 8.4 and 8.5).

Regarding SDG indicator 8.7.1, the proportion of children aged between 5 and 17 years who were working in 2018 was 3.3 per cent. The target is zero per cent by 2030 (national indicator 8.7.1).

No record is yet kept in Morocco of the number of fatal and non-fatal accidents at work per 100,000 workers, by sex and by immigration status (SDG indicator 8.8.1) or of the level of compliance with labour rights at national level by sex and migration status, in relation to International Labour Organization texts and national legislation. Consolidated data on accidents at work and occupational diseases for recent years are not available.

SDG target 8.9 has shown slight progress. The Mohammed VI Foundation for the Protection of the Environment projects include an educational and information component. The emphasis is on promoting sustainable tourism to contribute to economic growth and to preserve the environment, as set out in SDG target 8.9.

Progresses have been made concerning SDG 9. SDG target 9.1 has shown positive progress. Regarding SDG target 9.1 and 9.1.1, thanks to the development of the road network, the proportion of the rural population who live within 2 km of an all-season road has increased, which puts the country on track to achieve the target. However, the mode of transport for passengers and freight mainly remains by road. The development of rail would release pressure on the environment by reducing GHG emissions and allow the country to make progress towards achievement of SDG target 9.1. Data on passenger and freight volumes by mode of transport (SDG indicator 9.1.2) reported by UNSTAT confirm that most of the passenger and freight transport in Morocco is dominated by road.

The contribution of industry to overall GDP remained essentially the same between 2016 and 2018 but dropped to 16.9 per cent in 2019. The value added from manufacturing as a proportion of GDP and per capita (SDG indicator 9.2.1) remained stable, as in 2016. Furthermore, in the 2020 Voluntary National Review, employment in manufacturing as a proportion of total employment (SDG indicator 9.2.2) registered a slight increase, from 11.2 per cent in 2015 to 12 per cent in 2018.

SDG target 9.4 has shown positive progress. The CO₂ emission per unit of manufacturing value added gradually declined. SDG target 9.5 has shown slight progress. The Higher Council for Education, Training and Scientific Research recommended increasing R&D expenditure to 1.5 per cent of GDP by 2025. The world average for research is about 1.7 per cent of GDP, yet the amount of mainly public expenditure allocated to scientific and technical research in Morocco was 0.7 per cent of GDP in 2010 (SDG indicator 9.5.1). UNESCO reported that the number of researchers in Morocco rose from 720,000 in 2010 to 1,074,000 in 2016 (SDG indicator 9.5.2).

Innovation is key to building green industry. According to the World Intellectual Property Organization's 2020 Global Innovation Index, Morocco is ranked 75th of 131 countries. Morocco has consolidated its position as one of the most innovative countries of Africa. The proportion of medium and high-tech industry value added remained stable between 2012 and 2017, at around 27–28 per cent of total added value (SDG indicator 9.b.1).

Morocco has made some progress in making sustainable cities and communities, but not in all aspects. No data are available on target 11.4, SDG target 11.5 has regressed. SDG target 11.6 has shown positive progress. According to WHO, the annual mean levels of fine population weighted (SDG indicator 11.6.2) increased from 24.02 µg/m³ in 2011 to 28.4 µg/m³ in 2016. But the lack of data hinders the assessment of the achievement of SDG target 11.6. The study "Health and Air Pollution, Sustainable Development Goal 3 in Morocco" reviews the extent to which SDG target 11.6 relating to ambient air pollution have been reached. Regarding SDG indicator 11.6.2, the average level of particulate matter, weighted in relation to the estimated population of Morocco in 2010, was 19.5 µg/m³. It reached 25.4 µg/m³ in 2016 before beginning to show a gradual decrease. It is estimated to fall to 24.3 µg/m³ by 2030. These values remain extremely high compared with the threshold values recommended in WHO guidelines.

The present EPR recommends (recommendation 8.2) to the Government to take appropriate action to stimulate the achievement of SDG target 11.6. The Mohammed VI Foundation for the Protection of the Environment is constructed in harmony with ecosystems, affording the population sustainable spaces (SDG targets 11.6 and 11.7). Morocco's score for adoption and implementation of national DRR strategies in line with the Sendai Framework was 0.6 in 2016 and 0.7 in 2019 (SDG indicator 11.b.1), showing a positive trend towards achieving this indicator. However, while

Morocco implemented several measures to respond to crises, a national strategy for integrated risk management is still lacking.

Concerning the responsible consumption and production (SDG 12), Morocco progressed but has again some targets to achieve. This SDG is specifically addressed by the Department of Sustainable Development through an awareness-raising and support programme on green economy and product labelling. Sustainable modes of consumption and production in agriculture, fishing, industry and private housing can contribute to preventing and/or reducing coastal and marine pollution, minimizing the effects of ocean acidification and protecting marine and coastal ecosystems (SDG 12). According to Environment Live, Morocco generated 119,000 tons of hazardous waste in 2000 and almost 290,000 tons in 2013. However, there are no more recent data to enable assessment of Morocco's progress towards SDG target 12.4 and indicator 12.4.2 (a) and (b). Regarding SDG indicator 12.4.1, Morocco has consistently met its commitments and obligations by transmitting information to international conventions since 2010.

SDG target 12.5 has shown positive progress. Projects under the "Sauvegarde du littoral" Programme prioritize the sustainable development of coastal and maritime zones. They are a response to SDG targets 12.2 and 12.5 and their objective of sustainable consumption. The aim of the projects is as much to reduce pollution as to encourage local authorities to maintain standards of environmental compliance in coastal environments. Latest available data for the SDG target 12.4, 12.5 and indicator 12.5.1 date from 2015 and make it difficult to assess Morocco's progress towards achievement of this target. Morocco's level of implementation of the recommendations on waste management of the first EPR is mixed, and some remain valid. As at June 2021, no data are available on target 12.6, 12.7 and target 12.8. The country will not be able to attain SDG target 12.8 by 2030, unless it speeds up its efforts considerably and significantly increases the allocated resources for ESD. "Vision 2020" strategy focused on sustainable regional tourism is in keeping with SDG target 12.b. SDG target 12.c is not achieved.

Morocco has made progress in taking action to combat climate change and its impacts. In 2019, the number of died people, missing or affected by natural disasters was 0.18 per 100,000 population, a total of 751 people directly affected by a natural disaster (SDG indicators 13.1.1). According to the Sendai Framework Monitoring System, Morocco's score for adoption and implementation of national DRR strategies in line with the Sendai Framework was 0.6 in 2016 and 0.7 in 2019 (SDG indicator 13.1.2), showing a positive trend towards achieving this indicator. However, a national strategy for integrated risk management is still lacking. Morocco made progress in the implementation of national DRR strategies in line with the Sendai Framework, its score on adoption increasing by 16.7 per cent from 2016 to 2019 (SDG indicator 13.1.2).

The National Climate Plan for the period to 2030 is the national strategic document on climate change. It has been followed by seven regional plans to date. In 2021, Morocco revised its NDC, which was initially submitted in 2016. Producing these documents support the implementation of the Paris Agreement, SDG target 13.2 and SDG indicator 13.2.1. The ministry in charge of the environment is responsible for attaining SDG target 13.3. No information is available to enable the assessment of progress made by the mandated ministry in delivering on this target. The country will not be able to attain SDG target 13.3 by 2030, unless it speeds up its efforts considerably and significantly increases the allocated resources for ESD. The effort to adapt to climate change is pursued within the framework of Generation Green 2020–2030, which aims to continue and strengthen the adaptation programmes of the PMV with the strengthening of human capital. These incentives could help achieve SDG target 13.b. The coastal zone and sea are closely linked to policies to mitigate and adapt to changes in the climate and their impact. In this respect, SDGs 13 and 14 are interconnected in terms of building capacities, increasing knowledge production and exchange, and encouraging technological innovation.

Morocco shows different results concerning the sustainably use of marine resources. The targets of SDG 14 are interdependent, and that interdependency extends to the targets of all other SDGs in the sense of reinforcing the targets but also of having a negative impact on some of them. Sustainable modes of consumption and production in agriculture, fishing, industry and private housing can contribute to preventing or reducing coastal and marine pollution, minimizing the effects of ocean acidification and protecting marine and coastal ecosystems (SDG 14). The implementation of the Strategy Halieutis appears to have helped Morocco attain SDG target 14.2. However, the 2018 annual report of the Court of Auditors noted that some strategic objectives had not yet produced the expected results. In the case of fishing, 300 species are registered as commercial species, while the INRH monitors just 60 species. The third strategic area of the PNL contributes to achieving SDG targets 14.1 and 14.2. No discernible progress has been made on achieving SDG target 14.2 concerning EEZ management by deploying ecosystemic approaches. Various training tools are offered via the "Sauvegarde du littoral" Programme's projects to all relevant stakeholders in the regions. These projects prioritize the sustainable development of coastal and maritime zones. They are a response to SDG targets 14.1, 14.3, 14.7, 14.a and 14.c, which focus on protecting the maritime environment.

MPAs and no-take zones are widely used components of sustainable fishery management (SDG target 14.5) and can contribute to the conservation of marine biodiversity. The shortfall on Aichi Biodiversity Target 11 and SDG target 14.2 remains substantial. This gap is likely to worsen as the parties to the CBD are likely to agree to increase protected area coverage when setting the post-2020 global biodiversity targets. Morocco does not yet measure the indicator for coastal

eutrophication potential and floating plastic debris that would enable it to assess progress towards attainment of SDG target 14.1. The same applies to SDG target 14.3, as the average acidity (pH) of the seas is not measured, but Morocco is acting to remedy pollution. However, it is difficult to obtain a cohesive vision of efforts that have been forthcoming and have benefited from the development of integrated coastal and maritime zone management. An absence of data for some SDG targets means they cannot be quantified (14.1, 14.3, 14.4, 14.6, 14.a, 14.b, 14.c). Morocco does not measure the proportion of fish stocks with a biologically viable level, and so information is not available relating to SDG target 14.4. However, to fill in SDG target 14.4, Morocco has set up the indicator “Proportion of fish stocks caught/targeted that are managed sustainably”, which makes it possible to measure the achievement of the target. SDG target 14.5 has shown slight progress. The 2010 Law No. 22-07 on Protected Areas allowed for the creation of MPAs by setting out the legal provisions for their planning and management. In 2020, SDG target 14.5 had not been met. MPAs covered just 0.69 per cent of the total marine surface area. However, protected areas did cover 43.32 per cent of the surface area of key marine biodiversity sites. As the evolution of SDG indicator 14.5.1 reveals, the extension of MPAs, including fishery areas, remains extremely limited in response to Aichi Target 11. Thus recommendations 12.4 and 12.5 ask the Government to consider accelerating the extension of marine protected areas and streamline their management plans in close association with local stakeholders; also, Regional Commissions on Integrated Coastal Zone Management should ensure the integration of the management of marine protected areas in their respective regional coastal schemes. Although not mentioned in the 2020 VNR of progress towards the SDGs, these efforts to transpose international law into national law align perfectly with SDG target 14.c on enhancing conservation of oceans and their resources for more sustainable use by implementing the provisions of international law, as set out in the United Nations Convention on the Law of the Sea. SDG target 14.7 has regressed. The fifth PNL strategic area of the PNL will aid Morocco in its efforts to achieve SDG target 14.a.

Concerning the implementation of SDG targets relevant to biodiversity and protected areas, Morocco has made only limited progress and most of the objectives are not on track. In 2020, protected areas cover 53.32 per cent of the country’s Key Biodiversity Area, a marginal increase from 48.31 per cent in 2010. The country has made only limited progress towards achieving SDG targets 15.1 and 15.4. Geographically, the south of the country remains poorly represented in proportional terms within the national network of protected areas. 3.2 million ha of natural forest have a forestry management plan. Efforts towards third-party certification were made through the Morocco Forest Policy Support Programme (2013–2018). Morocco has strongly embraced SDG target 15.2. However, the other part of the SDG target (Halt deforestation, restore degraded forests and substantially increase afforestation and reforestation) is not sufficiently strengthened. Data for SDG 15.3 have not been updated since 2015. In the context of the National Action Programme to Combat Desertification, several activities have been implemented since 2014, including operationalization of a monitoring system and the establishment of two Technical Centres for Desertification Monitoring, watershed management on 800,000 ha with mechanical correction of ravines, water erosion control over 250,000 ha between 2015 and 2019, and control of siltation in continental and coastal areas over 41,000 ha. Fodder shrub resources were planted over 650,000 ha in response to overgrazing by transhumant herders. These activities directly contribute to SDG target 15.3. Between 2000 and 2015, the proportion of total land area considered as degraded stood at 5.35 per cent. In 2015, 9.6 per cent of the country’s land was estimated to be degraded (SDG indicator 15.3.1) but the trend cannot be assessed due to the lack of data. In 2001, Morocco adopted the National Action Programme to Combat Desertification. The 10-year Government Programme (2015–2024) includes as a priority the fight against desertification and silting up, as well as the fight against water erosion in mountain areas. According to the UNCCD, the land that is degraded was about 9.6 per cent of the total land area in 2015 (SDG indicator 15.3.1).

The IUCN Red List Index of species survival points to an increasingly threatened Moroccan fauna. As demonstrated in Morocco’s 2020 Voluntary National Review of implementation of the SDGs, several actions have been taken to reduce the degradation of natural habitats, halt the loss of biodiversity, protect and prevent the extinction of threatened species, notably in forest areas but also in freshwater and mountain ecosystems (SDG target 15.5). However, the impact has been rather limited. Projects under the “Sauvegarde du littoral” Programme focuses also on protecting biodiversity by encouraging a balance to be maintained among ecosystems in both ocean and land environments. Emphasis is placed on endangered species in keeping with SDG target 15.5. Since the first EPR, which highlighted a major gap in knowledge and conservation of genetic resources, the country adopted a set of national principles in 2013. However, the legal framework is not yet fully operational, which means that the country is not yet on track with the implementation of SDG target 15.6. Once adopted, the draft law No. 56-17 on access to genetic resources and the fair and equitable sharing of benefits arising from their use and knowledge would outline how Morocco will implement access and benefit-sharing. It is expected to establish a legal framework to guarantee and control access to genetic resources and the protection of traditional knowledge, and define rules guaranteeing fair and equitable benefit-sharing arising from the use of these resources. The need to conserve genetic resources and associated traditional knowledge, and share its benefits, is encapsulated in SDG target 15.6.

Data on poaching and illegal trafficking of wildlife are sparse, but Morocco has undertaken efforts to achieve SDG target 15.7. The country established a monitoring mechanism for wildlife with 19 monitoring and control units and strengthened the legal framework through the 2011 Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade, with several species added to Convention on International Trade of Endangered Species appendices. Legal hunting is regulated with bag limits and seasonal restrictions or bans on designated species. Illegal hunting remains a problem. The importance of controlling and combating Invasive alien species is identified in objective B5 of Morocco’s

NBSAP, consistent with SDG target 15.8. Law No. 76-17 on Plant Protection, referring to the control and monitoring of harmful species, came into force in July 2021. The implementation of this objective would support the realization of SDG target 15.8. No data are available for SDG 15.9 and 15.c. In line with SDG target 15.a, the 2020 VNR highlights the growing importance of mobilizing financial resources from all sources to finance programmes for the preservation and sustainable management of biodiversity and ecosystems. As an example, the budget dedicated to the forestry sector increased by 70 per cent in the last decade. Similarly, the budget for combating desertification and protecting the natural environment has increased by over 30 per cent since 2010. The VNR did not include any more information on SDG indicator 15.b.1.

The achievement of SDG 16, in terms of governance and institutions, does not exceed 64.2 per cent, on average. The 2020 Voluntary National Review of the implementation of the SDGs in Morocco notes that “despite the progress made by the country, the challenges remain, in particular, in terms of the establishment of totally independent and more transparent justice of inclusive decision-making and resolution of issues related to the exercise of fundamental freedoms and human rights in the context of new information and communication technologies, as well as those induced by terrorism”, but no data were available on SDG targets 16.3, 16.7 and 16.10 as they relate to the environment. SDG target 16.7 has shown positive progress. The approach of the regional coastal scheme for the Rabat-Salé-Kenitra Region contributes to achieving SDG target 16.7 as part of ICZM (Integrated Coastal Zone Management).

Concerning the implementation and revitalization of global partnership for sustainable development, some aspects are in progress, but data is still lacking as for the target 17.2. The Mohammed VI Foundation for the Protection of the Environment projects include an educational and information component. Above education, the various initiatives promote the concept of partnership by involving different public and private bodies, both national and international, as specified in SDG targets 17.9, 17.16 and 17.19. SDG indicator 17.14.1 only obtained a methodology in September 2020. The methodology recommends that governments convene a stakeholder group for self-scoring. The present EPR recommends (Recommendation 1.5) to convene a stakeholder group to score SDG indicator 17.14.1 on policy coherence for sustainable development and implement the identified measures to raise its score. Efforts are made to promote Public Private Partnership, which corresponds to progress towards achievement of SDG target 17.17, with a total investment of around US\$10,000 million.

*Annex III**Participation of Morocco
in multilateral environment agreements*

Year		Year	Status
1921	(BARCELONA) Convention and Statute on the Regime of Navigable Waterways of International Concern	1972	Ac
1921	(GENEVA) Convention Concerning the Use of White Lead in Painting (ILO 13)	1956	Ra
1924	(PARIS) International Agreement for the Creation of an Office International des Epizooties in Paris	1956	Ad
1925	(GENEVA) Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous, or Other Gasses, and of Bacteriological Methods of Warfare	1970	Ad
1946	(WASHINGTON) International Convention for the Regulation of Whaling	2001	Ra
1948	(GENEVA) Convention on the International Maritime Organization	1962	At
	1974 (LONDON) Amendments to Articles 10, 16, 17, 18, 20, 28, 31 and 32 of the Convention on the International Maritime Organization	1976	At
	1991 (LONDON) Amendments to the Convention (institutionalization of the Facilitation Committee); Resolution A.724 (17)	1995	At
	1993 (LONDON) Amendments to the Convention; Resolution A.735)	1995	At
1949	(ROME) Agreement for the Establishment of the General Fisheries Commission for the Mediterranean	1956	At
1951	(ROME) Convention for the establishment of the European and Mediterranean Plant Protection Organization	1972	Ac
1951	(ROME) International Convention on Plant Protection	1972	Ac
	1979 (ROME) Amendments to the International Plant Protection Convention	1980	Ac
1952	(BRUXELLES) International Convention for the Unification of Certain Rules relating to Civil Jurisdiction in Matters of Collision	1990	Ac
1954	(LONDON) International Convention for the Prevention of Pollution of the Sea by Oil	1968	Ra
1956	(NEW YORK) Statute of the International Atomic Energy Agency (IAEA)	1957	Ra
1960	(LONDRES) International Convention for the Safety of Life at Sea	1962	Ad
1966	(LONDON) Amendments to Chapter II of the 1960 International Convention for the Safety of Life at Sea	1968	Ra
1961	(BRUXELLES) International Convention for the Unification of Certain Rules relating to Carriage of Passengers by Sea	1963	Ra
1961	(GENEVA) International Convention for the Protection of New Varieties of Plants.	2006	Ad
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	1984	Si
	1988 (VIENNA) Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention	1992	Ra
	1997 (VIENNA) Amendment	1999	Ra
1963	(MOSCOW) Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water	1965	Ra
1966	(RIO DE JANEIRO) International Convention for the Conservation of Atlantic Tunas	1969	Ad
1967	(NEW YORK) Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies	1967	Ad
1967	(Kinshasa) Phytosanitary Convention for Africa	1976	Ra
1968	(LONDON) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space	1971	Ra
1968	(LONDON) Treaty on the Non-Proliferation of Nuclear Weapons	1970	Ra
	(LE CAIRE) Convention on Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)	1977	Ra
1968	(ALGIERS) African Convention on the Conservation of Nature and Natural Resources	1977	Ra
1969	(BRUXELLES) International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	1974	Ad
	1973 (LONDON) Protocol relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil	2001	Ad
	(BRUXELLES) International Convention on Civil Liability for Oil Pollution Damage	1974	Ad
	1992 (LONDON) Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	1992	Ra
	1992 (LONDON) Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	1992	Ra
	1992 (LONDON) Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage	2000	Ra

Year		Year	Status
1970	(ROME) Agreement for the Establishment of a Commission for Controlling the Desert Locust in Northwest Africa	1971	Ac
1971	(RAMSAR) Convention on Wetlands of International Importance Especially as Waterfowl Habitat	1980	Ra
	1982 (PARIS) Amendment	1985	Ad
1971	(GENEVA) Convention Concerning Protection Against Hazards of Poisoning Arising from Benzene	1974	Ra
1971	Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and Ocean Floor and in the Subsoil Thereof	1972	Ra
1971	(BRUXELLES) International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)	1992	De
	1976 (LONDON) FUND Protocol	1992	Ra
	1992 (LONDON) FUND Protocol	2000	Ra
	2003 (LONDON) FUND Protocol	2010	Ra
1972	(LONDON) Convention on International Liability for Damage Caused by Space Objects	1983	Ra
1972	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction	2002	Ad
1972	(LONDON) Convention on the International Regulations for Preventing Collisions at Sea	1977	Ad
1972	(PARIS) Convention concerning the Protection of the World Cultural and Natural Heritage	1975	Ra
1972	(GENEVA) International Convention for Safe Containers	1990	Ad
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1977	Ra
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild Fauna and Flora	1975	Ra
	1979 (BONN) Amendment	1986	
	1983 (GABORONE) Amendment	1990	Ra
1973	(LONDON) International Convention for the Prevention of Pollution from Ships (MARPOL, 73/78)	1993	Ad
	1978 (LONDON) Annex I on Prevention of Pollution by Oil	1993/1995	Ra
	1978 (LONDON) Annex II on Control of Pollution by Noxious Liquid Substances in Bulk	1993/1995	Ra
	1978 (LONDON) Annex III on Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form	1993	Ra
	1978 (LONDON) Annex IV on Prevention of Pollution by Sewage from Ships	1993	Ra
	1978 (LONDON) Annex V on Prevention of Pollution by Garbage from Ships	1993	Ra
	Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships	1993	Ad
1974	(LONDON) International Convention for the Safety of Life at Sea	1990	Ad
	1978 (LONDON) Protocol	2001	Ad
1976	(BARCELONA) Convention for the protection of the Mediterranean Sea against Pollution	1980	Ra
	1995 (BARCELONA) Amendment	2004	Ra
	1976 (BARCELONA) Protocol for the Prevention of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft	1980	Ra
	1995 (BARCELONA) Protocol for the Prevention and Elimination of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea	1997	At
	1976 (BARCELONA) Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency	1980	Ra
	2002 (VALETTA) Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol)	1980	Ra
	1980 (ATHENS) Protocol on the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (LBS Protocol)	1987	Ra
	1996 (SYRACUSE) Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities	1996	At
	1982 (GENEVA) Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1990	Ra
	1995 (BARCELONA) Specially Protected Areas and Biodiversity Protocol (replacing the 1982 Specially Protected Areas Protocol)	2009	Ra
	1994 (MADRID) Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (Offshore Protocol)	1999	Ad
	2008 (MADRID) Integrated Coastal Zone Management Protocol	2012	Ra
	1996 (IZMIR) Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	1999	Ra
	(GENEVA) Convention concerning Minimum Standards in Merchant Ships	1981	Ra
	(GENEVA) Convention on the Prohibition of Military or any Hostile Use of Environmental Modification Techniques	1977	Si
1977	(CAIRO) Protocol on cooperation between the North African Countries in the fight against desertification	1993	Ra

Year		Year	Status
1978	(HAMBURG) Convention on the Carriage of Goods by Sea	1981	Ad
1978	(LONDON) International Convention on Standards of Training, Certification and Watchkeeping for Seafarers	1997	Ad
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	1993	Ra
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats	2001	Ad
	1995 (THE HAGUE) African/Eurasian Migratory Waterbird Agreement (AEWA)	2012	Ra
	1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)	1999	Ra
1979	(VIENNA) Convention on the Physical Protection of Nuclear Material	1980	Si
1979	(LONDON) International Convention on Maritime Search and Rescue	1999	Ad
1980	(NEW YORK, VIENNA) Convention on the Physical Protection of Nuclear Material	2002	Ra
1981	(NEW YORK) Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects	2002	Ra
1982	(MONTEGO BAY) Convention on the Law of the Sea	2007	Ra
	1994 Agreement relating to the implementation of Part XI	2007	Ra
	1995 (NEW YORK) Agreement for the implementation of the provisions relating to the conservation and management of straddling fish stocks and highly migratory fish stocks	2012	Ra
	1997 (NEW YORK) Agreement on the Privileges and Immunities of the International Tribunal for the Law of the Sea		
	1998 (KINGSTON) Protocol on the Privileges and Immunities of the International Seabed Authority		
1984	(ABIDJAN) Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Regi		
1985	(VIENNA) Convention for the Protection of the Ozone Layer	1985	Ra
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	1995	Ra
	(1985) Kigali Amendment to Protocol	2022	Ra
	1990 (LONDON) Amendment to Protocol	1995	Ra
	1992 (COPENHAGEN) Amendment to Protocol	1995	Ra
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1993	Ra
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	1993	Ra
1987	(ADDIS-ABEBA) Statute of African Centre of Meteorological Applications for Development	1993	Ra
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1995	Ra
1990	(LISBON) Cooperation Agreement for the Protection of the Coasts and Waters of the North-East Atlantic against Pollution	2008	Ra
	2008 (LISBON) Additional Protocol to the Lisbon Agreement	2012	Ra
	(LONDON) International Convention on Oil Pollution Preparedness, Response and Co-operation	2003	Ra
1991	(DAKAR) Regional Convention on Fisheries Cooperation among African States Bordering the Atlantic Ocean	1999	Ra
1992	(NEW YORK) Framework Convention on Climate Change	1995	Ra
	1997 (KYOTO) Protocol	2002	Ad
	2015 (PARIS) Paris Agreement	2016	Ra
1992	(RIO) Convention on Biological Diversity	1995	Ra
	2000 (CARTAGENA) Protocol on Biosafety	2011	Ra
	2010 (NAGOYA) Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity		
1992	(NOUAKCHOTT) Maghreb Charter for Environment Protection and Sustainable Development	1992	Si
1993	(PARIS) Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction	1995	Ra
1993	(RABAT) Convention establishing the Organization for Plant Protection in the Middle East	1994	Ra
1993	(ROME) Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas	2001	Ra
1994	(PARIS) Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1996	Ra
1995	(LONDON) International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea	2003	Ad
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage	1999	Ra
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	1999	Ra
1997	(NEW YORK) Convention on the Law of the Non-Navigational Uses of International Watercourses	2011	Ac

Year		Year	Status
1998	(CASABLANCA) African Regional Centre for Space Science and Technology — in French Language	2000	Ra
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2011	Ac
1998	(BAMAKO) Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa		
2001	(STOCKHOLM) Convention on Persistent Organic Pollutants	2004	Ra
2001	(ROME) International Treaty on Plant Genetic Resources for Food and Agriculture	2006	Ra
2001	(LONDON) International Convention on Civil Liability for Bunker Oil Pollution Damage	2010	Ra
2001	(PARIS) Convention on the Protection of the Underwater Cultural Heritage	2011	Ra
2001	(LONDON) International Convention on the Control of Harmful Anti-fouling Systems on Ships	2010	Ra
2003	(PARIS) Convention for the Safeguarding of Intangible Cultural Heritage	2006	Ra
2013	Minamata Convention on Mercury	2014	Si

Ac = Accession; Ad = Adherence; At = Acceptance; De = Denounced; Si = Signed; Ra = Ratification.

Annex IV

List of major environment-related legislation

1914–1969

Dahir of 25 August 1914 on the regulation of unsanitary, inconvenient or dangerous industrial plants

Dahir No. 1335 of 10 October 1917 on the conservation and exploitation of forests

Dahir No. 1341 on the trade of poisonous substances

Dahir du 12 September 1949 creating a forest fund

Dahir of 15 November 1958 for the protection, enhancement and sustainable management of the coast, waves and its users

Dahir No. 1-69-170 on soil protection and rehabilitation

Decree of 8 September 1918 on the conditions of exploitation, peddling and sale of forest products

Decree of 15 January 1921 on the right of passage in state forests

1973

Law No. 1-73-255 forming regulations on maritime fishing

1976

Law No. 1-76-350 on the Organization of the Participation of the Population in the Development of the Forest Economy

1992

Law No. 12-90 on Urban Planning

1993

Law No. 17-88 of 10 September 1993 concerning the indications of shelf life to be included on canned and similar foods and on bottled water intended for human or animal consumption

1995

Law No. 10-95 on Water

1997

Law No. 42-95 relating to the Control and Organization of Trade in Agricultural Pesticides

1998

Decree No. 2-97-487 setting out the conditions for water withdrawal points

Decree No. 2-97-657 on the conditions for setting water protection, conservation and prohibition zones to protect water from pollution, including agricultural pollution

Decree No. 2-97-787 on water quality standards and the inventory of the degree of water pollution

2002

Law No. 78-00 containing the Communal Charter

2003

Law No. 11-03 on the Protection and Conservation of the Environment

Law No. 12-03 on Environmental Impact Assessment

Law No. 13-03 on Combating Air Pollution

2006

Law No. 22-80 on the protection of the tangible and intangible cultural heritage

Law No. 28-00 on Waste Management and Disposal

Law No. 54-05 on the Delegated Management of Public Services

2008

Law No. 25-06 on Protected Geographical Indication (PGI)

Decree No. 2-04-563 on the functions and operations of the national committee and regional committees of environmental impact assessment

Decree No. 2-04-564 concerning attributions and functioning of the National Committee and the Regional Environmental Impact Assessment Committees

Decree No. 2-07-253 of 18 July 2008 on waste classification and determining the list of hazardous waste

2009

Decree No. 2-09-139 on medical and pharmaceutical waste management

Decree No. 2-09-286 setting standards for air quality and the procedures for air monitoring

2010

Law No. 13-09 on Renewable Energy

Law No. 16-09 on the National Agency for Renewable Energy Development and Energy Efficiency

Law No. 22-07 on Protected Areas

Law No. 28-07 on Food Safety

Law No. 57-09 creating the Moroccan Agency for Solar Energy

Decree No. 2-09-674 setting the conditions and modalities for the installation and use on board fishing vessels of a continuous positioning and tracking system using satellite communications for data transmission

Decree No. 2-09-538 establishing the procedures for developing the national master plan for managing hazardous waste

2011

Law No. 24-09 on the Safety of Goods and Services

Law No. 29-05 on the Protection of Wild Fauna and Flora and Control of their Trade

Law No. 30-05 on road transportation of dangerous goods

Framework Law No. 34-09 on the Health System and the Provision of Care

Law No. 47-09 of 29 September 2011 on Energy Efficiency

Decree No. 2-09-85 on the collection, transport and treatment of certain used oils

Decree No. 2-10-578 of the 11 April 2011 allows for the opening of renewable energy production to the private sector

2012

Law No. 39-12 relating to the Organic Production of Agricultural and Aquatic Products

Decree No. 2-12-389 setting out the conditions and labelling methods for food products.

2013

Decree No. 2-12-624 on establishing the Permanent Interministerial Commission responsible for the Development of Rural Areas and Mountainous Areas

2014

Law No. 15-12 on the Prevention and Combating of Illegal, Undeclared and Unregulated Fishing

Law No. 86-12 on Public-private Partnership Contracts

Framework Law No. 99-12 on the National Charter for the Environment and Sustainable Development

Law No. 142-12 on Nuclear and Radiological Safety and Security and the Creation of the Moroccan Agency for Nuclear and Radiological Safety and Security

Decree No. 2-13-358 fixing the Composition and Mode of Operation of the National Commission for Organic Production

Decree No. 2-13-359 taken in application of Law No. 39-12 relating to the Organic Production of Agricultural and Aquatic Products

Decree No. 2-13-874 setting out the rules for energy performance of buildings

Decree No. 2-14-500 establishing the Interministerial Water Commission

Decree No. 2-14-758 setting the Powers and Organization of the Ministry in Charge of the Environment

2015

Law No. 81-12 on the Coastal Zone

Law No. 27-13 on Quarries

Law No. 33-13 on Mines

Organic Law No. 65-13 on the Organization and Conduct of the Work of the Government and the Legal Status of its Members

Organic Law No. 130-13 on Finances

Law No. 77-15 on the Prohibition of the Manufacture, Import, Export, Marketing and Use of Plastic Bags

Organic Law No. 111-14 on the Regions

Organic Law No. 112-14 on Prefectures and Provinces

Organic Law No. 113-14 on Municipalities

Decree No. 2-14-85 on Management of hazardous waste

Decree No. 2-12-484 issued for the application of Law No. 29-05 on the Protection of Species of Wild Flora and Fauna and the Control of their Trade

Decree No. 2-14-782 on the organization and functions of the Environmental Police

Decree No. 2-15-769 on the composition, competences and functioning modalities of the National Commission and the Regional Commissions of Integrated Coastal Management as well as on the modalities of elaboration of the National Integrated Coastal Zone Management Plan and the regional schemes on the coastal areas

Decree No. 2-15-772 setting the conditions and terms of access to the national medium voltage electricity grid for electricity generation facilities using renewable energy sources

2016

Law No. 113-13 on Pastoral Transhumance and the Development and Management of Pastoral and Silvo-pastoral areas

Law No. 30-15 on Dam Safety

Law No. 36-15 on water

Law No. 37-16 modifying and supplementing Law No. 57-09 Establishing the Company Moroccan Agency for Solar Energy

Law No. 39-16 related to the creation of a national agency for the development of renewable energies and energy efficiency

Law No. 48-15 on the Regulation of the Electricity Sector and the Creation of the National Electricity Regulatory Authority

Law No. 58-15 amending and supplementing Law No. 13-09 on Renewable Energies

Law No. 74-15 on the Tafilalet and Figuig Mining Region

Decree No. 2-16-299 setting the procedure for drawing up the regional development programme, its monitoring, updating, evaluation and the mechanisms for consultation and consultation for its preparation

Decree No. 2-16-300 laying down the procedures for drawing up the development programme of the prefecture and the province, its monitoring, updating, evaluation and the consultation and consultation mechanisms for its development

Decree No. 2-16-301 setting the procedure for drawing up the action plan of the municipality, its monitoring, updating, evaluation and the consultation and consultation mechanisms for its development

Decree No. 2-15-807 on the procedure for granting mining titles

2017

Decree No. 2-17-197 relating to the powers of the Minister of Agriculture, Maritime Fisheries, Rural Development and Water and Forests

Decree No. 2-17-201 relating to the powers of the Minister of Equipment, Transport, Logistics and Water

Decree No. 2-17-203 relating to the powers of the Minister of Energy, Mines and Sustainable Development

Decree No. 2-17-585 relating to the impact study that must accompany certain bills

Decree No. 2-17-690 relating to water basin agencies

2018

Law No. 31-13 on the Right of Access to Information

Decree No. 2-17-587 on import, export, and transit of waste

Decree No. 2-17-618 on the National Charter of Administrative Decentralization

Decree No. 2-18-339 relating to the National Water Plan, the Master Plan for Integrated Water Resources Development and the Local Water Management Plan

Decree No. 2-18-104 on conditions and modalities for the installation and use on board fishing vessels of a continuous positioning and tracking system using satellite communications for data transmission

Decree n° 2-18-453 (14 September 2018) relating to the conditions and modalities of commissioning of water police officers and the exercise of their functions

2019

Law No. 47-18 on the Reform of Regional Investment Centres and the Creation of Unified Regional Investment Commissions

Framework Law No. 51-17 relating to education, training and scientific research

Law No. 62-17 on Administrative Supervision and Management of Communal Land

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Decree No. 2-18-233 on High Council for Water and Climate

Decree No. 2-19-452 on the organization of the National Commission on Sustainable Development

Decree No. 2-18-722 on fisheries development and management plans

Decree No. 2-17-746 on mandatory energy audits and audit bodies

2020

Law No. 49-17 on environmental assessment

Law No. 34-18 on Phytopharmaceutical Products

Law No. 53-18 on Fertilizers and Growing Media

Law No. 57-18 amending and supplementing Law No. 77-15 on the Prohibition of the Manufacture, Import, Export, Marketing and Use of Plastic Bags

Decree No. 2-19-721 on the establishment of the National Commission on Climate Change and Biodiversity

Decree No. 2-19-1085 relating to the powers of the Minister of Industry, Trade and the Green and Digital Economy

Decree No. 2-19-1094 on the reorganization of the Ministry of Equipment and Water

2021

Law No. 22-80 relating to the protection of the tangible and intangible cultural heritage

Law No. 69-18 on Pollution by Ships

Law No. 76-17 on Plant Protection came into force in July 2021

Annex V

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www.indh.ma/

Agence nationale pour le développement des zones oasiennes et de l'arganier
<http://andzoa.ma/fr/>

GGGI Morocco
<https://ggi.org/country/morocco/>

Banque européenne d'investissement
website www.eib.org

Water Resources Institute
www.wri.org

FAOLEX Database
www.fao.org/faolex/en/

Global Footprint Network
www.footprintnetwork.org/

Global Invasive Species Database (GISD)
www.iucngisd.org/gisd/

Aires et territoires du patrimoine autochtone et communautaire
www.iccaconsortium.org/index.php/fr/

IUCN Red List of Threatened Species
www.iucnredlist.org/

Key Biodiversity Areas

www.keybiodiversityareas.org/

Médiateur

www.mediateur.ma/fr.

Office national de sécurité sanitaire des produits alimentaires

www.onssa.gov.ma

Agence nationale pour le développement de l'aquaculture

www.anda.gov.ma/fr/secteur-aquacole-marocain-0

Haut-Commissariat au Plan

www.hcp.ma/

<http://plateforme-odd.hcp.ma/>

Institut national de la recherche agronomique

www.inra.org.ma

Université Perpignan

<https://mjp.univ-perp.fr/constit/ma2011.htm>

World Database on Protected Areas

www.protectedplanet.net

Programme national des déchets ménagers

www.pncl.gov.ma/fr/grandchantiers/Pages/PNDM.aspx

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www.sigmaweb.org/publications/Prestation-services-administratifs-Maroc-Juin-2019.pdf

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SIREED

Tangier-Tétouan-El Hoceima

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Souss-Massa

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Casablanca-Settat

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Morocco

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