

Croatia

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Second Review



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Foreword

In 1993, Environmental Performance Reviews (EPRs) of the United Nations Economic Commission for Europe (ECE) were initiated at the second "Environment for Europe" Ministerial Conference, in Lucerne, Switzerland. They were intended to cover the ECE member States that are not members of the Organisation for Economic Co-operation and Development (OECD). Subsequently, the ECE Committee on Environmental Policy decided to make them part of its regular programme.

At the fifth "Environment for Europe" Ministerial Conference (Kiev, 2003), the Ministers affirmed their support for the EPR Programme, and decided that the Programme should continue with a second cycle of reviews. This second cycle, while assessing the progress made since the first review process, puts particular emphasis on implementation, integration, financing and the socio-economic interface with the environment. The seventh "Environment for Europe" Ministerial Conference (Astana, 2011) formally endorsed the third cycle of reviews. As a response to new global and regional concerns, it was decided that integrating green economy into the third cycle of the EPR Programme promises to add value to its work, first, due to its relevance and importance for the countries under review and, second, due to the potential to enhance international cooperation with the community of donors and investors.

Through the peer review process, EPRs also promote dialogue among ECE member States and the harmonization of environmental conditions and policies throughout the region. As a voluntary exercise, an EPR is undertaken only at the request of the country concerned.

The studies are carried out by international teams of experts from the region working closely with national experts from the reviewed country. The teams also benefit from close cooperation with other organizations in the United Nations system, for instance the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP), as well as with the European Environment Agency (EEA), World Health Organization (WHO) and other organizations.

This is the second EPR of Croatia published by ECE. The review takes stock of progress made by the country in the management of its environment since the country was first reviewed in 1999. It assesses the implementation of the recommendations in the first review (annex I). This second EPR also covers nine issues of importance to the country related to policymaking, planning and implementation, the financing of environmental policies and projects, and the integration of environmental concerns into economic sectors, in particular water management, waste management, biodiversity and protected areas, and tourism.

I hope that this second EPR will be useful in supporting policymakers and representatives of civil society in their efforts to improve environmental management and to further promote sustainable development in Croatia, and that the lessons learned from the peer review process will also benefit other countries of the ECE region.



Sven Alkalaj
Executive Secretary
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Preface

The second Environmental Performance Review (EPR) of Croatia began in October 2012 with a preparatory mission. During this mission, the structure of the review report was discussed and the time-schedule established. A review mission took place on 12-19 March 2013. The team of international experts taking part included experts from Austria, Czech Republic, Germany, the Republic of Moldova, Slovakia and as well as from the EEA and the secretariats of the United Nations Environment Programme (UNEP) and ECE.

The draft EPR report was submitted to Croatia for comment and to the Expert Group on Environmental Performance Reviews in August 2013 for consideration. During its meeting on 1-2 October 2013, the Expert Group discussed the report in detail with representatives of the Government of Croatia, focusing in particular on the conclusions and recommendations made by the international experts.

The EPR recommendations, with suggested amendments from the Expert Group, were then submitted for peer review to the nineteenth session of the ECE Committee on Environmental Policy on 24 October 2013. A high-level delegation from Croatia participated in the peer review. The Committee adopted the recommendations as set out in this report.

The Committee on Environmental Policy and the ECE review team would like to thank the Government of Croatia and its experts who worked with the international experts and contributed their knowledge and assistance. ECE wishes the Government of Croatia further success in carrying out the tasks involved in meeting its environmental objectives, including the implementation of the recommendations in this second review.

ECE would also like to express its appreciation to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and to the German Federal Environment Agency for their support to the EPR Programme through the Advisory Assistance Programme for Environmental Protection in the Countries of Central and Eastern Europe, the Caucasus and Central Asia; and to Austria, Czech Republic, Germany, EEA and UNEP for having delegated their experts for the review; and the United Nations Development Programme for its support of the EPR Programme and this review.



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CONTENTS

Foreword.....	iii
Preface	v
List of team members	vii
List of contributors	viii
Key abbreviations	xix
Signs and measures.....	xxi
Currency conversion table	xxii
EXECUTIVE SUMMARY	xxiii
 INTRODUCTION	
I.1 Demographic and socio-economic context.....	1
I.2 Key environmental trends.....	2
 PART I: POLICY MAKING, PLANNING AND IMPLEMENTATION	
 Chapter 1: Policymaking framework for environmental protection and sustainable development	
1.1 Legal Framework	11
1.2 Policy Framework	14
1.3 Strategic Environmental Assessment	19
1.4 Green Economy Initiatives	20
1.5 Institutional Framework	21
1.6 Conclusions and Recommendations	28
 Chapter 2: Compliance and enforcement mechanisms	
2.1 Main developments since 1999	31
2.2 Institutional framework for compliance assurance.....	31
2.3 Legal framework	33
2.4 Regulated community.....	36
2.5 Environmental assessment tools and permitting	37
2.6 Compliance promotion and voluntary schemes.....	40
2.7 Identification of non-compliance: self-monitoring and inspection	42
2.8 Non-compliance responses.....	43
2.9 Conclusions and recommendations	47
 Chapter 3: Monitoring, information and education	
3.1 Environmental monitoring	51
3.2 Environment reporting and information systems	54
3.3 Legal, policy and institutional framework	57
3.4 Environmental education	59
3.5 Conclusions and recommendations	60
 Chapter 4: Implementation of international environmental agreements and commitments	
4.1 Major developments since the first EPR	63
4.2 Framework for international environmental cooperation.....	63
4.3 Global multilateral environmental agreements.....	63
4.4 Regional and subregional multilateral environmental agreements.....	66
4.5 International technical assistance on the environment	71

	<u>Page</u>
4.6 Sustainable development and millennium development goals	72
4.7 Conclusions and recommendations	72
 PART II: MOBILIZING FINANCIAL RESOURCES FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	
 Chapter 5: Economic instruments and financing of environmental protection expenditure	
5.1 Introduction	77
5.2 Economic instruments	77
5.3 Environmental protection expenditures and their financing	85
5.4 International level	90
5.5 Institutional Framework	91
5.6 Policy framework for strengthening environmental expenditure and investments for greening the economy	94
5.7 Conclusions and recommendations	94
 PART III: INTEGRATION OF ENVIRONMENT INTO ECONOMIC SECTORS AND PROMOTION OF SUSTAINABLE DEVELOPMENT	
 Chapter 6: Waste management	
6.1 Introduction	99
6.2 Current situation	99
6.3 Environmental pressures from waste	104
6.4 Legal framework	105
6.5 Policy and institution framework	107
6.6 Conclusions and recommendations	112
 Chapter 7: Sustainable management of water resources	
7.1 Water supply and demand – current situation and trends	113
7.2 Management of water use and prevention of pollution	114
7.3 Water management	118
7.4 Wastewater management	118
7.5 Legal, policy and institutional framework	119
7.6 Conclusion and recommendations	122
 Chapter 8: Biodiversity and protected areas	
8.1 Trends in species and ecosystems	125
8.2 Trends in development and management of protected areas and ecological networks	125
8.3 Pressures on species and ecosystems	129
8.4 Legal framework	134
8.5 Policy framework	134
8.6 Institutional framework	135
8.7 Economic instruments	137
8.8 Selected projects	137
8.9 Conclusions and recommendations	138
 Chapter 9: Tourism	
9.1 Current situation	139
9.2 Pressures from tourism on the environment	144
9.3 Legal, policy and institutional framework	147
9.4 Conclusions and recommendations	150

ANNEXES

I	Implementation of the recommendations in the second review.....	155
II	Participation of Croatia in multilateral environmental agreements.....	181
III	Key data and indicators available for the review.....	185
IV	List of major environment-related legislation.....	193
Sources	.....	197

LIST OF TABLES

1.1	Environmental NGOs.....	27
2.1	EIA procedures carried out in Croatia in the period 2000-2011.....	38
2.2	Selected indicators of inspection work on the environment (number of inspections).....	44
2.3	Inspections carried out and administrative non-compliance measures taken by SEI.....	44
2.4	Judicial enforcement of environmental cases through misdemeanour courts.....	46
3.1	Water monitoring stations, number.....	53
5.1	Share of special tax on the basis of vehicle price.....	80
5.2	Part of the special tax on the basis of average emissions of carbon dioxide (CO ₂).....	81
5.3	Passenger car and motorcycle road tax.....	81
5.4	Tax on vessels.....	81
5.5	Excise duties on fuel.....	83
5.6	Average electricity selling prices (VAT excluded), HRK/kWh.....	83
5.7	Petroleum product retail prices (HRK/l) – annual average.....	84
5.8	Average selling price of natural gas, VAT included.....	84
5.9	Environmental protection expenditures, investments and revenues from private and State-own businesses, 1,000 HRK.....	86
5.10	EPEEF's actual investment in environmental protection and energy efficiency, 1,000 HRK, 2004-2012.....	88
5.11	Environmental expenditure from central and local governments, million HRK.....	92
5.12	Collected income of the Environmental Protection and Energy Efficiency Fund, 1,000 HRK.....	92
5.13	Sources of revenue of Croatian Waters, 1,000 HRK.....	93
6.1	Municipal waste generation by region, tons.....	100
6.2	MSW Composition, percentage.....	100
6.3	Disposal sites by amount of received waste, 2010.....	101
6.4	Separately collected municipal solid waste, 2011.....	102
6.5	Generation of industrial waste, tons.....	103
6.6	Collected amounts of special waste streams, tons.....	104
6.7	Transboundary movement of waste, tons.....	105
6.8	Trends in waste management permitting, number of companies.....	111
7.1	Abstracted water, 1,000 m ³	114
7.2	Water supply and losses, 1,000 m ³	114
7.3	Assets and resources protected from floods.....	119
7.4	Wastewater collected, 1,000 m ³	119
7.5	Discharge of wastewater from the public sewage system, 1,000 m ³	120
8.1	Number of known and endemic taxa.....	126
8.2	Number of plant and animal taxa included in red list by group and IUCN categories.....	126
8.3	Habitat types according to the EUNIS classification.....	126
8.4	Percentage of protected areas.....	128
8.5	Protected areas, 2012.....	128
8.6	Catches and production of sea fish, crustaceans, oysters, other molluscs and shellfish.....	130
8.7	Consumption of mineral fertilizers, tons.....	131
8.8	Hunting.....	132
8.9	Forest area, hectares.....	133

	<u>Page</u>
8.10 Forest damage caused by fire, hectares	133
9.1 Tourist arrivals and overnights, 1,000, 2005-2012.....	142
9.2 Accommodation capacities (rooms) by type of facility, situation on 31 August 2012	142
9.3 Accommodation capacities (beds) by type of facility, situation on 31 August 2012	142
9.4 Tourist arrivals and nights, by type of tourist resort, thousands, 2007-2011	143
9.5 Tourism and the environment.....	145

LIST OF FIGURES

I.1 Air emissions, 2005=100.....	2
I.2 GHG emissions in CO ₂ equivalent in Gigagrams, 2005–2011.....	3
I.3 Shares of main sector emissions, 2011	4
I.4 Water abstraction, 2005–2012	6
I.5 Water use, 2005–2012.....	6
I.6 Wastewater discharges, 2005–2012	6
I.7 Treatment of wastewater from public sewage system, 2005–2012.....	7
I.8 Land use	7
I.9 Waste generation, 2005–2011	7
1.1 State of environment reports adopted and not adopted by the counties and the City of Zagreb in 2005, 2008 and 2011	18
1.2 Structure of the Ministry of Environmental and Nature Protection	23
2.1 Trends in the number of ISO 14001 certified companies in selected countries	41
5.1 Percentage of environmental expenditure in total budgets of central and local governments.....	87
7.1 Production of electricity, GWh.....	117
8.1 Total catches and production of sea fish, crustaceans, oysters, other molluscs and shellfish	131

LIST OF MAPS

I.1 Map of Croatia.....	8
3.1 Air quality monitoring sites.....	52
3.2 Monitoring sites for measuring inland water quality	53
3.3 Radioactivity	55
7.1 Overview map of sanitary protection zones for water sources.....	115
8.1 Protected areas.....	127
8.2 Croatian Ecological Network in 2007	129

LIST OF BOXES

2.1 Enforcement strategy applied to air pollution cases.....	44
4.1 Neretva and Trebišnjica Management Project.....	71
6.1 Municipal waste management in Zagreb.....	101
6.2 Management of oil and gas waste in Croatia.....	103
8.1 Large carnivore monitoring in Croatia	137
9.1 Research on cultural tourism in Croatia	140
9.2 Water shortages in Croatia	146
9.3 Tourism and the environment in Hvar.....	148

LIST OF PHOTOS

I.1	Monument in Split to commemorate 1,000-year anniversary of the first mentioning of fishing	3
1.1	The city of Dubrovnik, a World Heritage site	18
2.1	Monument to Ban Jelacic, Zagreb	34
3.1	An ancient meteorological station in Zagreb	52
4.1	A ferry line on Adriatic Aea, Split	69
5.1	Splitska bank office, Split	79
6.1	Separate waste collection in park-forest Marjan, Split	100
7.1	Waste water treatment plant in Bartolovec	115
8.1	Mandarin tree in Dubrovnik	127
9.1	Tourist information centre in Zagreb	140

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KEY ABBREVIATIONS

ACO	Authorized Consultancy Organization
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Seas, Mediterranean and Contiguous Atlantic Area
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
APSCP	Action Plan for Sustainable Consumption and Production
AQIS	Air quality information system
ASCI	Areas of Special Conservation Interest
BAT	Best available techniques
BREF	Best available techniques reference documents
CAP	Common Agricultural Policy
CARDS	Community Assistance to Reconstruction, Development and Stabilization
CBD	Convention on Biological Diversity
CEA	Croatian Environment Agency
CEE	Croatian Chamber of Economy
CEIS	Croatian environment information system
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLRTAP	Convention on Long-range Transboundary Air Pollution
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CSD	UN Commission on Sustainable Development
CSR	Corporate Social Responsibility
DIA	Directorate for Inspection Affairs
ECE	United Nations Economic Commission for Europe
EEA	European Environment Agency
EIA	Environmental impact assessment
EIONET	European Environment Information and Observation Network
EIS	Environmental impact study Eco-Management and Audit Scheme (EMAS)
ELV	Emission limit value
EPA	Environmental Protection Act
EPEEF	Croatian Environmental Protection and Energy Efficiency Fund
EPIS	Environmental Protection Information System
EPP	Environmental protection programmes
EPR	Environmental Performance Reviews
EPR	Environmental Pollutant Register
ETS	Emission Trading System
EUNIS	European Union Nature Information System
FDI	Foreign Direct Investment
FSC	Forest Stewardship Council
GDP	Gross domestic product
GEF	Global Environmental Facility
GHG	Greenhouse gas
GLOBE	Global Learning and Observations to Benefit the Environment
GMO	Genetically Modified Organisms
HCFCs	hydrochlorofluorocarbons
HDI	Human Development Index
IAEA	International Atomic Energy Agency
IAS	Invasive Alien Species
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
IPA	Instrument for Pre-accession Assistance
IPPC	Integrated pollution prevention and control
ISPA	Instrument for Structural Policies for Pre-Accession
ISWC	Interstate Water Commission
IUCN	International Union for Conservation of Nature
LCP	Large combustion plants
LCS	Large combustion sources

LPG	Liquid Petroleum Gas
LV	Limit value
MAC	Maximum allowable concentration
MAP	Mediterranean Action Plan
MBT	Mechanical and biological treatment
MDG	Millennium Development Goal
MEA	Multilateral Environmental Agreement
MSSD	Mediterranean Strategy for Sustainable Development
MSW	Municipal solid waste
NBSAP	National Biodiversity Strategy and Action Plan
NCEA	National Classification of Economic Activities
NEPP	National Environmental Protection Plan
NES	National Environmental Strategy
NPP	Nuclear power plant
NSDS	National Sustainable Development Strategy
ODS	Ozone-depleting substance
OECD	Organisation for Economic Co-operation and Development
PCBs	Polychlorinated biphenyls
PHARE	Programme of Community Aid to the countries of Central and Eastern Europe
POPs	Persistent Organic Pollutants
PPP	Purchasing power parity
PRTR	Pollutant Release and Transfer Registers
RBMP	River basin management plan
RIA	Regulatory Impact Assessment
SCP	Sustainable consumption and production
SEA	Strategic environmental assessment
SEI	Sector for environmental inspection
SILC	Survey of Income and Living Conditions
SINP	State Institute for Nature Protection
SOC	Soil organic carbon
SoER	State of environment report
SOPs	Standard Operating Procedures
SME	Small- and medium-sized enterprises
SNPI	Sector for nature protection inspection
SPA	Special protected area
UNCCD	United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WEEE	Waste electrical and electronic equipment
WFD	Water Framework Directive
WHO	World Health Organization
WISE	Water Information System of Europe
WMC	Waste management centre

SIGNS AND MEASURES

..	not available
-	nil or negligible
.	decimal point
€	euro
\$	dollar
Ci	Curie
GWh	gigawatt-hour
ha	hectare
HRK	Kuna
kg	kilogram
kJ	kilojoule
km	kilometre
km ²	square kilometre
km ³	cubic kilometre
kgoe	kilogram of oil equivalent
ktoe	kiloton of oil equivalent
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	metre
m ²	square metre
m ³	cubic metre
MW	megawatt
ppm	parts per million
s	second
t	ton
toe	ton of oil equivalent
tofe	ton of fuel equivalent
TWh	terawatt-hour

CURRENCY CONVERSION TABLE

Year	Kuna per Euro
2005	7.40
2006	7.32
2007	7.34
2008	7.22
2009	7.34
2010	7.29
2011	7.44
2012	7.52
2013	7.58

Source: ECE common database (accessed January 2014).

Executive summary

The first Environmental Performance Review (EPR) of Croatia was carried out in 1999. This second review intends to measure the progress made by Croatia in managing its environment since the first EPR, especially from 2005, and the potential for addressing upcoming environmental challenges.

Croatia's GDP achieved an average 4.1 per cent growth rate during 2005-2008. However, the international financial crisis led to a contraction of GDP by 6.9 per cent in 2009 and 2.3 per cent in 2010. Year 2011 saw zero growth but the contraction continues, as the latest available figures show a 2 per cent decrease for 2012. Croatia's ranking in the UNDP's *Global Human Development Report* remained constant: with a Human Development Index (HDI) score in 2012 of 0.805, it came 47th out of a total 186 countries, the same ranking as in 2005. Progress was made in Croatia's gender parity, with women occupying 24 per cent of Parliament seats and several high political offices. The 2012 Gender Inequality Index was 0.179, placing Croatia in 47th place out of 186 countries.

Key environmental indicators showed a positive trend. Air pollution emissions were reduced, with the exception of the share of mobile source emissions from total NO_x emissions, which increased from 62.6 per cent in 2005 to 65.3 per cent in 2011. Total greenhouse gas emissions decreased by 7.2 per cent, while CO₂ emissions alone during the same period decreased by 11.1 per cent. Total waste generation stayed steady over the review period: 3.39 million tons in 2005 and 3.38 million tons in 2011. Designated protected areas expanded from 7.23 per cent of the national territory in 2005 to 8.45 per cent in 2013.

Polymaking framework for environmental protection and sustainable development

Since 1999, Croatia has made significant progress in adopting and strengthening environmental legislation, with progress on laws in various sectors, such as air quality and waste management. However, implementation of some of these laws is less encouraging and several strategic documents are out of date. With regard to the policy framework, some strategic documents need to be updated, such as the National Environmental Strategy of 1999, which expired in 2012. Croatia, moreover, is still in the process of adopting river basin management plans.

Green Economy Initiatives signify a step forward for Croatia. The 2001 Strategic Guidelines for Green Economic Development include a set of action plans and strategic documents for developing a green economy. However, the Guidelines do not set concrete goals, activities or deadlines and there are no institutional mechanisms for coordination and monitoring. Despite this deficiency, several green economy initiatives have started since 1999. A total of €3.2 million financed 78 projects in the sustainable building sector related to energy efficiency in lighting and heating, the substitution of primary energy sources in boiler plants and the optimization of combustion plants.

Public institutions such as the Croatian Environment Agency, the Environmental Protection and Energy Efficiency Fund and the State Institute for Nature Protection, under the competence of the Ministry of Environmental Protection, provide additional oversight of environmental policy and information and are largely independent. The Agency was established in 2002 to analyze and interpret environmental data and provide information necessary for environmental policymaking. The Fund was established in 2003 as an extra-budgetary legal entity for ensuring the implementation of environmental protection programmes on waste management, nature conservation, sustainable consumption, energy efficiency and renewable energies. The State Institute was established in 2002 and provides expertise on nature protection.

While significant progress is lauded, Croatia has room for improvement in strengthening its institutional mechanisms. In particular, there is a need for greater promotion of strategic environmental assessments (SEA) and the establishment of quality assurance mechanisms for implementing SEAs. SEA implementation remains deficient, due in part to the weak role that the Ministry of Environmental and Nature Protection plays in the SEA screening process and procedures. The Ministry of Environmental and Nature Protection lacks, moreover, a dedicated unit for coordinating subnational environmental protection.

Compliance and enforcement mechanisms

Since 1999, Croatia has established an environmental regulation and compliance assurance system that responds to the needs arising from the country's international obligations. Environmental impact assessment (EIA) is well developed in Croatia, with a number of cases of application in many areas. Both permitting and EIA procedures have been amended to make them more transparent. Public participation has improved, as well as coordination with administrative procedures such as integrated permitting. Croatia has transposed the EU Directive on integrated pollution prevention and control (IPCC), although there is insufficient capacity for implementation and a backlog of IPCC permits are awaiting issue.

While Croatia has made significant progress in compliance and enforcement, better use of compliance promotion instruments and procedures would strengthen its effectiveness and capacity for administrative and judicial enforcement. Compliance promotion and voluntary schemes are relatively limited, although environmental labelling has been gradually put in place: as of early July 2013, 13 manufacturing companies and 15 hotel/campsite operators have been awarded the national environmental label. The system for carrying out environmental inspections largely follows internationally recognized practices and its capacity has proved efficient. Training of industrial operators is taking place.

Environmental monitoring, information, public participation and education

Croatia has made significant improvements in environmental monitoring, in particular for air quality, bathing and drinking water, and radioactivity. Monitoring, which has improved since 2002, is largely the purview of the Croatian Environment Information System, comprising over 40 different databases. The CEA is charged with establishing, maintaining and coordinating a single national environmental information system consisting of several environmental databases. Gaps remain in monitoring bio-diversity, soil, noise, vibrations and land use (except for forestry), although educational workshops aim to improve these areas.

Preparation of state of the environment reports is on track under the responsibility of the CEA. However, an inordinately long approval process threatens the credibility of these reports, since figures are often outdated by the time they are published. In order to reduce the time lag of available data, the CEA has started to publish *Selected Indicators of the Environment in Croatia*.

Croatia is active in environmental education, from kindergarten level, for which around 40 environmental experts have been trained in eco-programmes, to university level, where ecology is part of natural and social science courses. The country has adopted the Strategy on Education for Sustainable Development. Two hundred eco-schools and 130 regular schools in Croatia follow the Global Learning and Observations to Benefit the Environment programme.

Implementation of international environmental agreements and commitments

Since 1999, Croatia has ratified 22 Multilateral Environmental Agreements (MEAs). Since 2005, Croatia has taken on a broad range of measures to ensure participation in and implementation of MEAs. Implementation is low at regional and local levels due to a lack of awareness and knowledge about MEAs.

*In terms of technical assistance on the environment, Croatia has benefited from EU programmes for transposing the *acquis communautaire* into Croatian legislation, as well as from cooperation with major international financial institutions, UNEP and the Global Environmental Fund (GEF).* Cooperation with GEF has included 30 projects, 14 on national level and 16 on regional level. The majority of national projects focus on biodiversity and climate change; regional projects focus mostly on international waters. Cooperation with UNEP has centred mainly on sustainable consumption and production, and implementing the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution.

Croatia adopted the National Sustainable Development Strategy (NSDS) in 2009 and submitted its first progress report on the Millennium Development Goals (MDGs) in 2006. In 2010, it also submitted its second national report on MDG Implementation for 2006-2010, which showed a positive trend in achieving MDG-7 ("Ensuring Environmental Sustainability"). However, the link between the NSDS and the MDGs is weak, with a lack of coherent indicators to track progress.

Economic instruments for environmental protection

The majority of State subsidies are directed towards sectoral support and not horizontal expenditure in favour of environmental protection and green initiatives. However, some taxation schemes can be seen to support greening the economy, such as the exclusion of electric cars from the special tax on road vehicles.

The country has a diversified charge system for the main pollution and emission sources – these economic instruments consist of air pollution, water and waste charges. In addition to standard municipal and industrial waste levies, Croatia also taxes packaging waste, used tyres, end-of-life vehicles, used batteries, accumulators and oils.

Although the country adheres to an air pollution charge system for CO₂, SO₂ and NO₂, and around 1,200 polluters are obliged to pay levies, the system is not sufficiently effective as the charges do not reflect regional differences; levies have not been raised since 2008 and the unit charges are not inflation adjusted.

Energy-related economic instruments are inversely related to consumption, rewarding higher energy consumption. The price structure does not motivate consumers to conserve energy nor does it give incentives for energy-saving innovations and investment in energy efficiency.

A greenhouses gas emission trading system was established in 2008. Installations participating in the trading system have been obliged to obtain emission permits since 2009 and have monitored emissions from installations and submitted annually verified reports since 2010. Croatia joined the EU's Emission Trading Scheme phase III in 2013 – ahead of its accession to the EU.

Funding for environmental protection changed significantly during the review period. In nominal terms, local Government expenditure stayed almost the same, but a doubling of central Government expenditure increased inflation-adjusted total expenditure levels by almost 50 per cent from 2005 to 2011. The Croatian Environmental Protection and Energy Efficiency Fund provided loans, grants and subsidies to promote and stimulate green initiatives totalling €148.6 million from 2005-2011.

Waste management

Croatia has made significant progress in waste management, with political commitment to the importance of setting up waste management plans and providing reliable data and information on waste. It exports hazardous waste to countries with more developed facilities. Considerable work has been done within the legislative framework for waste management, including the transposition of EU directives on solid waste and management of special waste streams, including batteries, packaging and vehicle waste. However, information on the environmental impact of waste management in Croatia is limited.

Positive trends in waste management include investment in the recycling infrastructure and development of regional waste management centres (WMC). WMCs ensure basic safe management of municipal solid waste. However, the current system lacks consolidation and therefore faces the challenge of redirecting waste from more than 146 disposal sites to 20 WMCs. Groundwater and air pollution caused by landfill is insufficiently controlled, and a significant amount of biodegradable waste is landfilled.

Sustainable management of water resources

Around 50 per cent of the public water supply in Croatia comes from groundwater. From 2005 to 2012, the volume of water abstracted increased from 511 million m³ to almost 570 million m³ per year. In addition to domestic demand on water resources, tourism brings increased pressure, especially during the touristic period.

Flooding is also a problem, causing considerable environmental damage. Investments in the maintenance of flood protection systems were insufficient until 2005. Since then, revenues from water protection charges have grown significantly, but are still insufficient to develop a protection system. Flood prevention measures are in place and early warning systems and alarms are used, but the safety of inhabitants and assets in many potential flood areas is not yet ensured.

Household wastewater has increased significantly due to a greater connection ratio. In 2005, around 126 million m³ of wastewater originated from households, rising to about 184 million m³ in 2012. Approximately one third of the wastewater collected is discharged into the environment, for example untreated wastewater discharge into the sea. However, a clear improvement has been visible since 2007. Sewage sludge poses a persistent problem.

Biodiversity and protected areas

Since 2005, protected areas have increased by 18.2 per cent and now cover 8.45 per cent of the total national territory. Almost all national and nature parks have management plans, sometimes including visitor management. No national monitoring system exists and capacity and equipment are deficient, although some species are monitored, e.g. large carnivores and some bird species.

The greatest threat to native wild taxa in Croatia is the destruction and loss of habitat. This occurs in particular when natural habitats are converted into urbanized areas or agricultural land, or following the construction of roads and other transport, which lead to the fragmentation of habitats. Wild taxa are also threatened by the introduction of non-native species, overexploitation in the fishing sector and the pollution of water, soil and air.

Tourism and the environment

In 2012, the travel and tourism sector directly accounted for approximately 12 per cent of GDP. In 2012, the sector's total contribution to employment, including jobs indirectly supported by the industry, was 30.2 per cent of total employment (319,000 jobs). Croatia has some of the best quality bathing waters in Europe. Of the 919 coastal bathing sites in Croatia, 876 have excellent bathing water, 27 good quality and 3 have poor quality water.

Total waste generation from tourism is not particularly significant in terms of quantity, but may be relatively high for tourist locations taken in isolation. Data on municipal waste generated by the tourism sector are hidden in the total municipal waste data. Disposal of waste on the islands is prohibited. The country makes efforts to relocate existing waste and unregulated landfills away from coastal areas in WMCs.

INTRODUCTION

I.1 Demographic and socio-economic context

Population

Most of Croatia's population indicators have been stable or changed very little since 2005. The total population, which was 4.3 million in 2012 (mid-year estimate), has been slowly but steadily decreasing since 2005. Crude birth rate and fertility rates have remained stable, reaching respectively 9.8 and 1.5 in 2012. Infant mortality rates dropped from 5.7 per 1,000 in 2005 to 3.6 per 1,000 in 2012.

Economic and social development

Croatia's economy is service-based with the tertiary sector accounting for 58.7 per cent of total gross domestic product (GDP) in 2011. Tourism is an important part of the tertiary sector, producing about 15 per cent of GDP. The industrial sector produced 22.9 per cent of total GDP, with agriculture, forestry and fishing accounting for the remaining 4.2 per cent.

GDP, measured in 2005 constant prices, grew from 2005 to 2008 at an average annual growth rate of 4.1 per cent. However, the international financial crisis caused GDP to contract by 6.9 per cent in 2009 and 2.3 per cent in 2010. 2011 saw zero growth, but the contraction seems to be continuing, since the latest available figures show a 2 per cent decrease for 2012.

Positive economic development caused the unemployment rate to drop from 17.8 per cent in 2005 to 13.5 per cent in 2008, but it has been steadily rising since, reaching 20.9 per cent in 2012. In spite of the slow post-financial crisis recovery and high unemployment figures, in terms of income per capita, Croatia is still ahead of some European Union Member States, such as Bulgaria and Romania. Estimated GDP per capita in purchasing power parity (PPP) in 2012 was around US\$20,532 or 60 per cent of the EU average.

The external debt situation deteriorated during the review period, and the Croatian National Bank had to take steps to curb the growth of local banks' indebtedness to foreign banks. The dollar debt figure was adversely affected by the €/USD exchange rate ratio – over a third of the increase in debt since 2002 is due to currency value changes. Since 2005, the Croatian kuna has fluctuated between 4.9 and 5.9 kuna per US\$.

Croatia's economy is heavily dependent on trade – exports of goods and services made up 42.6 per cent of GDP in 2011. Croatia's main trading partner, the EU, was the source of 61.8 per cent of the country's imports and the destination of 59.8 per cent of its exports in 2011.

Inflation has been moderate since 2005. It was 3.3 per cent (measured by Consumer Price Index) in 2005 and rose to 6.1 per cent in 2008, but fell back to 3.4 per cent in 2012. Cumulated Foreign Direct Investment (FDI) grew from US\$10.6 billion in 2005 to US\$27.3 billion in 2011. The annual amount of FDI has varied from a high point of 5.6 per cent of GDP in 2007 to 0.7 per cent in 2010.

The country's Human Development Index (HDI) score was 0.805 in 2012, placing it 47th out of the 186 countries measured. In 2005, Croatia also ranked 47th out of 177 countries compared.

The latest 2013 Millennium Development Goal (MDG) indicators provide figures for the population living below the national poverty line for 2004, at which point 11.1 per cent of Croatians lived below the poverty line. According to the Statistical Yearbook, 16.3 per cent of the population was at risk of poverty in 2006, which had increased to 18.0 per cent in 2009. These figures were calculated by the Croatian Bureau of Statistics and based on the data collected through the Household Budget Survey. The poverty indicators for 2010 and 2011 were calculated using data collected through the Survey of Income and Living Conditions (SILC) following EU regulations and in line with Eurostat's EU-SILC survey methodology. According to the SILC, the at-risk-of-poverty rate was 20.6 per cent in 2010 and 21.1 per cent in 2011. Since the indicators from these two data sources are calculated using different methods, they should be considered separately.

Gender

Croatia's Constitution covers gender equality, and its Parliament has enacted several laws to protect women against discrimination, effectively creating the legal provisions for equal opportunities for men and women.

Croatia has achieved gender parity in access to education. The 2010 female-to-male ratio for primary school enrolment was 1.00, and 1.07 for secondary school enrolment. The current Parliament, elected in

2011, includes 36 female members holding 24 per cent of the seats of Parliament. Women must, by law, represent at least 40 per cent of candidate lists for each political party at all levels. Women have attained high political offices, including the Prime Minister, the President of the Constitutional Court and several members of the Supreme Court.

The country's 2012 Gender Inequality Index was 0.179, placing Croatia 47th out of 186 countries. The Global Economic Forum's 2011 Global Gender Gap Index gives Croatia a score of 0.701, placing it 50th (out of 135 countries).

I.2 Key environmental trends

Air and Climate Change

Air

Sulphur dioxide (SO₂) emissions diminished from 63,644 tons in 2005 to 38,792 tons in 2011 – a drop of 39.1 per cent. Total SO₂ emissions in 2011 were noticeably lower than the 70-thousand-ton emissions target set for Croatia by the Gothenburg Protocol, which Croatia ratified in 2008. Most SO₂ was emitted from the combustion of fossil fuel in electricity-generating power stations and industrial plants, with its share in the total increasing from 73.3 per cent in 2005 to 77.3 per cent in 2011. A similar development took place for emissions of nitrogen oxides (NO_x) (81,369 tons in 2005 to 66,345 tons in 2011) and ammonia (NH₃) (40,383 tons in 2005 to 36,812 tons in 2011), which dropped by 18.5 and 8.8 per cent respectively. The share of mobile source emissions in

total NO_x emissions increased from 62.6 per cent in 2005 to 65.3 per cent in 2011.

Mercury (Hg) emissions decreased by 8.4 per cent between 2005 and 2010, while cadmium (Cd) emissions dropped by 3.3 per cent during the same period.

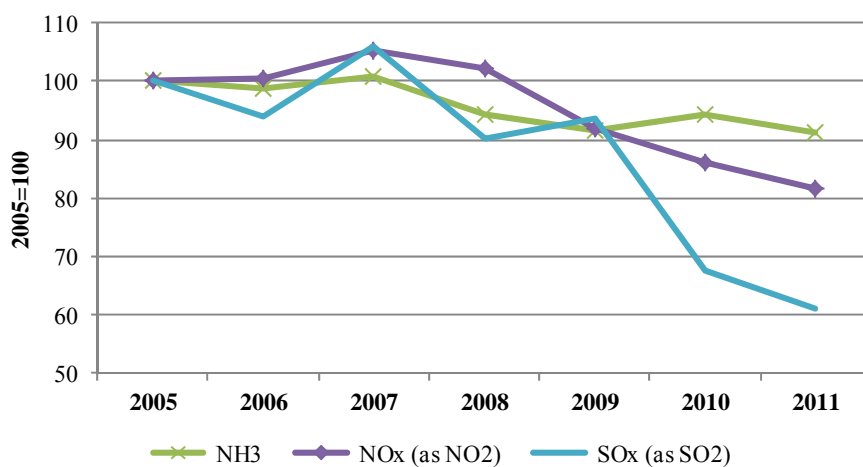
Greenhouse gas emissions

Between 2005 and 2011 total greenhouse gas (GHG) emissions decreased by 7.2 per cent, while CO₂ emissions decreased by 11.1 per cent. Over the same time period, methane (CH₄) emissions increased by 12.0 per cent and HFC emissions increased by 42.7 per cent.

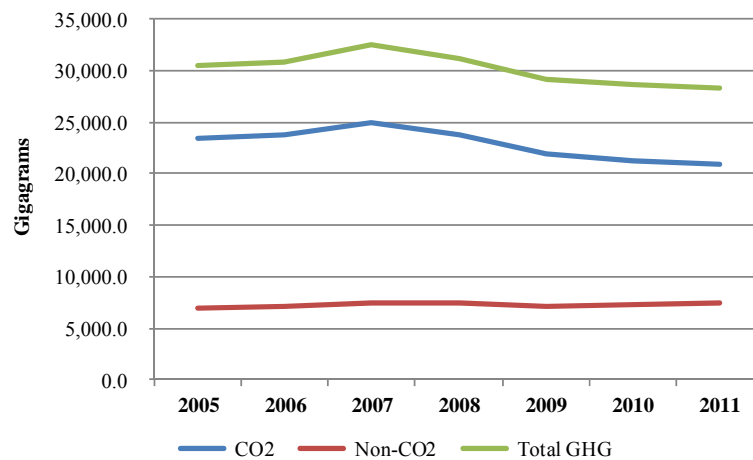
The energy sector, which produced 74.4 per cent of the total GHG emissions in 2005 and 73.3 per cent in 2011, reduced its emissions by 8.6 per cent. Emissions from industrial processes and agriculture diminished during the same period by 8.9 and 4.6 per cent respectively. Emissions from solvents dropped by 26.0 per cent from 2005 to 2011, while GHG emissions from waste increased by 32.4 per cent.

In 2011, the energy industry was the biggest emitter in the energy sector, with a 30.3 per cent share of energy-related GHG emissions, while transport produced 28.4 per cent of the sector's GHG emissions. Within the comparison period, from 2005 to 2011, transport-related emissions increased by 4.5 per cent, while emissions from manufacturing and construction fell by 23.1 per cent, energy industries by 7.7 per cent, other sectors by 14.7 per cent, and fugitive emissions by 8.5 per cent.

Figure I.1: Air emissions, 2005=100



Source: Centre on Emission Inventories and Projections of the European Monitoring and Evaluation Programme, 2013

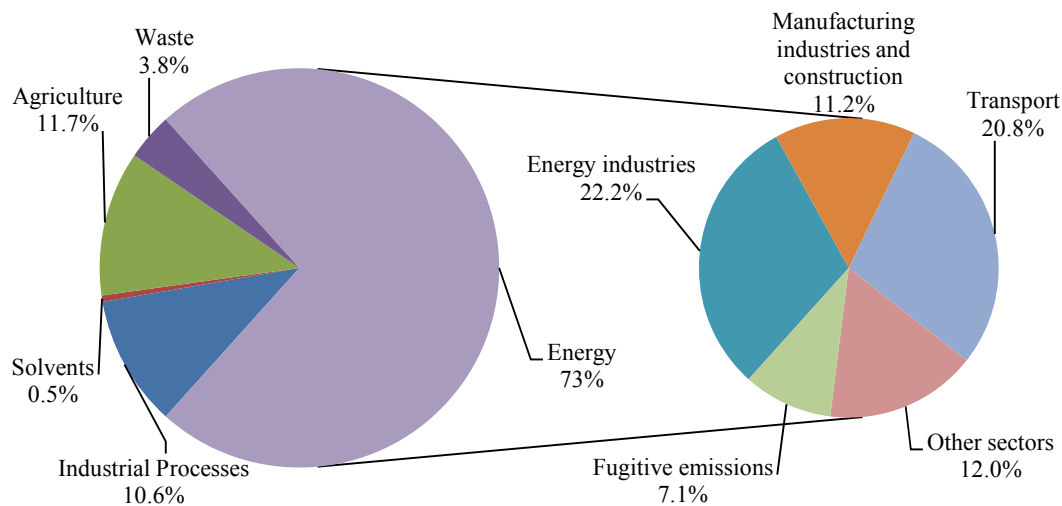
Photo I.1: Monument in Split to commemorate 1,000-year anniversary of the first mentioning of fishing**Figure I.2: GHG emissions in CO₂ equivalent in Gigagrams, 2005–2011**

Source: UNFCCC database http://unfccc.int/ghg_data/ghg_data_unfccc/ghg_profiles/items/4625.php. Accessed 9.9.2013

*Surface and groundwater*Water abstraction and use

The quantity of water abstracted increased steadily over the review period. In 2005, the public water supply system provided 511 million m³ of abstracted water, while in 2012 about 569.4 million m³ were distributed – a 11.4 per cent increase compared to 2005. Almost half (48.9%) of the public water supply came from underground sources in 2012. There were some moderate changes in water use patterns between 2005 and 2012. The amount of total water

supplied increased by 17.2 per cent. Households' water usage stayed almost the same throughout the period, while water usage for economic activities increased 9.5 per cent between 2005 and 2012, although it has been on a downward trend since 2009. Water losses from the total abstracted water were almost the same in 2005 and 2012, about 40.2 and 37.1 per cent respectively, yet although the loss percentage diminished over the comparison period, the absolute amount of water losses increased to 211 million m³ because the total amount of water delivered also increased.

Figure I.3: Shares of main sector emissions, 2011

Source: UNFCCC database at http://unfccc.int/ghg_data/ghg_data_unfccc/ghg_profiles/items/4625.php. Accessed on 9.9.2013

Wastewater discharges

Between 2005 and 2012, wastewater discharges increased by 53.8 per cent. Over 56 per cent of wastewater was generated by households. Out of the 328 million m³ discharged in 2012, about 24 per cent was untreated, compared to 38 per cent in 2005.

Water quality

Surface water

The quality of inland surface water was evaluated over the period 2006–2010 and then categorized into five classes of which class I is the highest water quality and class V the lowest quality. The median annual BOD₅ concentration values in the watercourses of the Danube River Basin District corresponded to class II values, while those of the Adriatic River Basin District corresponded to class I. No significant changes were recorded during the period observed. A slight decline in BOD₅ recorded in the Adriatic River Basin District may be attributable to the construction of public sewage systems and the operation of new urban wastewater treatment plants. The median annual concentration of BOD₅ in rivers was 1.8 mg O₂/l in 2006 and 1.5 mg O₂/l in 2010.

Groundwater

Croatian regulations specify a maximum allowable concentration (MAC) of 50 mg/l nitrates in groundwater. The annual mean concentrations of nitrates in groundwater are way below the MAC. The

average concentrations in the Danube River Basin District decreased from 7.9 mg NO₃/l in 2007 to 7.8 mg NO₃/l in 2010, while in the Adriatic River Basin District the concentrations were 4.2 mg NO₃/l in 2007 and 2.7 mg NO₃/l in 2010. High nitrate values, sometimes exceeding the MAC, have been recorded in specific areas of the Drava and the Danube rivers basins as a consequence of wastewater discharge and agricultural land run-off.

Coastal water

Coastal bathing waters are monitored along the whole length of the Croatian coast, from the Istrian Peninsula in the north to the Dubrovnik-Neretva County in the south. The number of sampling points on the beaches increased from 851 in 2005 to 906 in 2011. In 2005, 8,845 samples were analyzed compared to 9,144 samples in 2011. Of these samples, only 1.5 per cent in 2005 and 0.09 per cent in 2011 did not meet bathing water criteria. The water quality was even better during the 2012 season, when 96.8 per cent of water samples were rated to be of excellent quality and 2 per cent good quality. The few remaining zones with water quality problems are located either next to large towns, such as Pula, Rijeka, Šibenik and Split, or close to large estuaries with nutrient flows into the sea.

Land and soil

Soil

Soil organic carbon (SOC), an indicator of soil quality, is typically in the range of 1 to 6 per cent of

the total topsoil mass. In general, Croatian forests have abundant organic matter with SOC concentration ranging from 4 to 12.6 per cent. Intensive agriculture has had a negative impact on agricultural land, where the SOC content has diminished to between 0.2 and 6.2 per cent.

The average Carbon to Nitrogen ratio of Croatian soil is 12:1 indicating good soil quality. A Carbon-Nitrogen ratio analysis of 2,500 soil samples showed that 88.8 per cent of Croatian soil samples were within a range from 8:1 to 15:1.

Land use

Land use has not changed since 2000. The area of forested land increased a little from 38.1 per cent in 2000 to 40.9 per cent in 2010. Cropland, grassland and other land areas diminished somewhat, while the area of wetlands did not change at all.

Flora and fauna

Animal and plant species were subject to slight changes. The number of threatened vascular plants (223 species) stayed the same throughout the review period (2005-2012). The number of threatened mammal species remained at seven for the period. The bird situation (breeding and non-breeding population) deteriorated slightly – in 2012, 72 species were threatened while in 2008 the number was 67.

In 2012, the largest share of threatened species in the total number of assessed species was cave fauna, for which almost 99 per cent of the 186 species assessed were under threat. After cave species, the largest share of threatened species was lichen (82%).

Protected areas

In 2005, designated protected areas covered a total area of 6,334.3 km², or 7.23 per cent of the national territory. There were 452 protected areas in nine categories, although most belonged to the nature park category.

As of October 2013, the Register of Protected Areas of the Ministry of Environmental and Nature Protection listed 419 protected areas in various categories, and the total area had expanded to 7,400.2 km² covering 8.45 per cent of the country.

Waste

Illegal dumping of waste has been a problem in Croatia. In 2005, approximately 3,000 illegal dumpsites existed in the country. The Environmental

Protection and Energy Efficiency Fund (EPEEF) has assisted municipalities in cleaning up illegal dumpsites; at the beginning of 2012, 750 dumpsites had been cleaned up and waste from these sites had been transferred to authorized disposal sites.

There was no change in the total waste generation over the review period. In 2005, annual waste generation stood at 3.39 million tons and dropped by 0.3 per cent to 3.38 million tons in 2011.

Municipal waste

The amount of municipal waste generated increased from 1.4 million tons in 2005 to almost 1.8 million tons in 2008 but then started to diminish. In 2011, municipal waste generation was 1.51 million tons.

Special waste stream

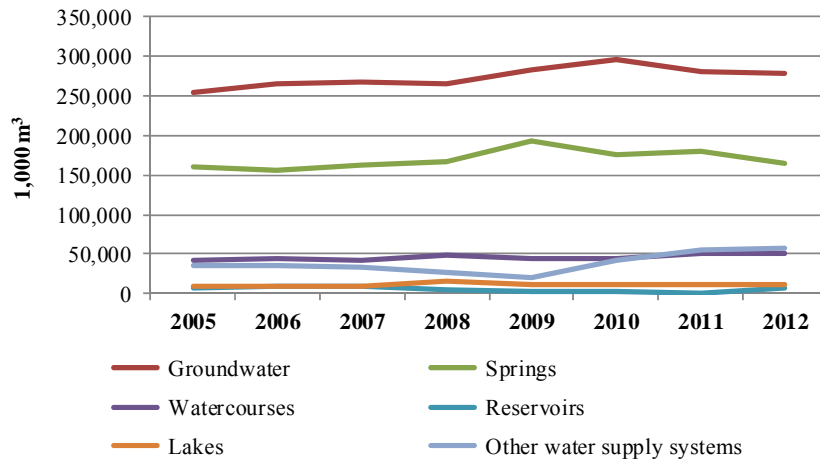
The amounts collected from all special waste stream items, except packaging waste, increased during the review period. The amount of packaging collected dropped from 198,225 tons in 2006 to 125,258 tons in 2011, a 37 per cent decrease. Packaging formed the bulk of special stream waste throughout the review period – about 93 per cent in 2005 and 59 per cent in 2011. Collection of other special waste has increased continuously since 2006. For example, the quantity of end-of-life-vehicles collected increased more than fivefold from 2007 to 2011, and waste electrical and electronic equipment (WEEE) more than tripled from 2008 to 2011 (table 6.8)

Non-hazardous industrial waste

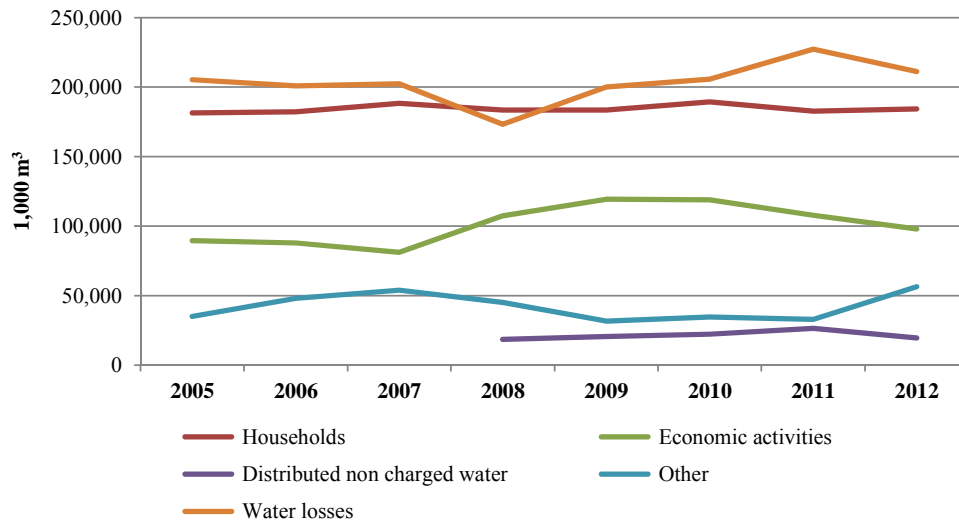
In 2005, about 98.9 per cent of the total waste was non-hazardous and industrial non-hazardous waste made up about 57.3 per cent of all waste. In 2011, about 98 per cent of waste was non-hazardous and the share of industrial non-hazardous waste had dropped to 53.3 per cent of the total.

Hazardous waste

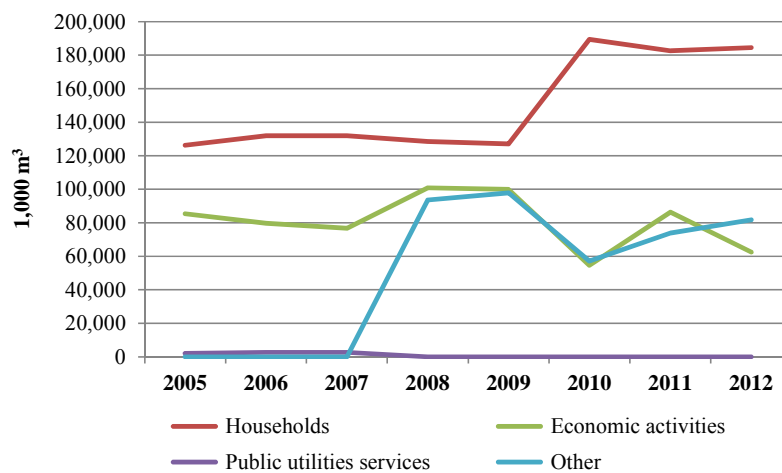
Hazardous waste generation in Croatia is one of the lowest per capita in the European Union. In 2005, Croatians generated 8.3 kilograms of hazardous waste per capita, which increased to 16 kilograms per capita in 2011. Since hazardous manufacturing waste makes up most of the hazardous waste (between 92 and 97 per cent over the review period), the 79 per cent increase in hazardous manufacturing waste over the review period pushed up the total hazardous waste generation, which rose by 84.7 per cent, from 36,995 tons in 2005 to 68,333 tons in 2011.

Figure I.4: Water abstraction, 2005–2012

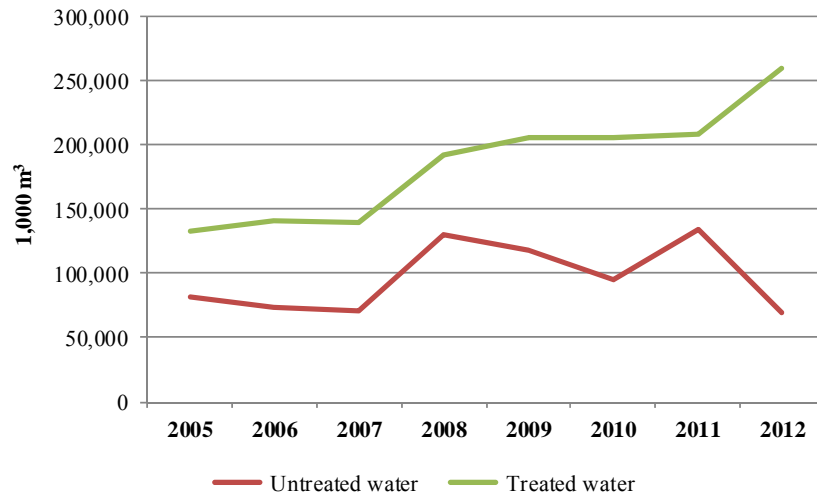
Source: Statistical Yearbook 2012.

Figure I.5: Water use, 2005-2012

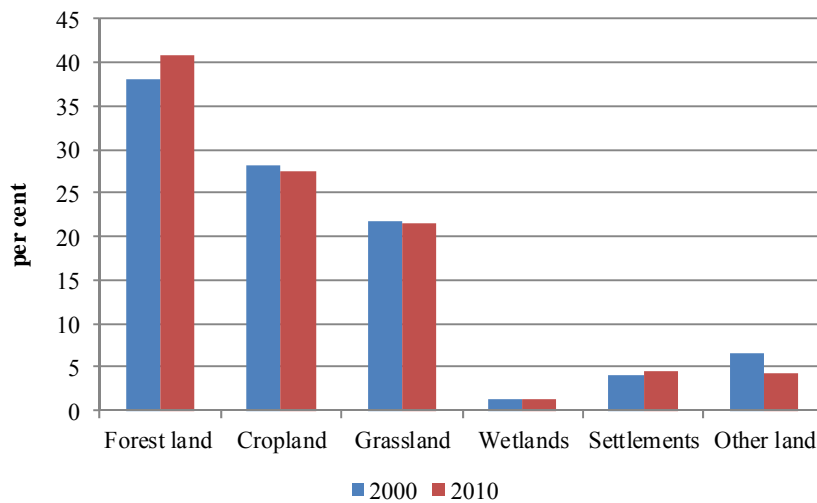
Source: Statistical Yearbook 2012.

Figure I.6: Wastewater discharges, 2005–2012

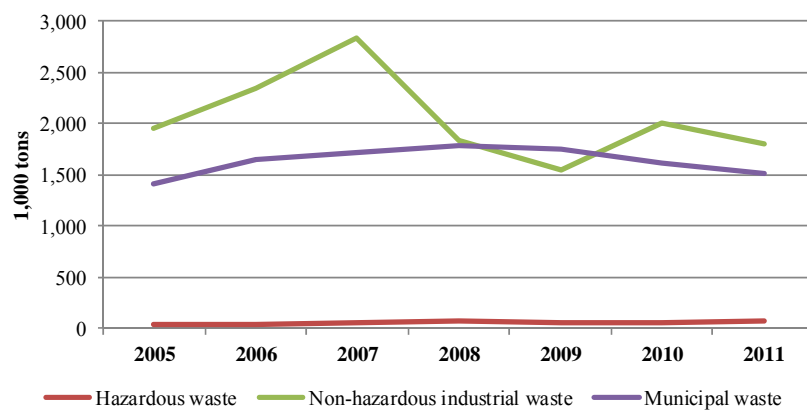
Source: Statistical Yearbook 2012.

Figure I.7: Treatment of wastewater from public sewage system, 2005–2012

Source: Statistical Yearbook 2012.

Figure I.8: Land use

Source: CEA, 2013.

Figure I.9: Waste generation, 2005–2011

Source: CEA, 2013.

Map I.1: Map of Croatia



Source: United Nations Cartographic Section, 2011.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

***PART I: POLICY MAKING, PLANNING AND
IMPLEMENTATION***

Chapter 1

POLICYMAKING FRAMEWORK FOR ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT

1.1 Legal Framework

Harmonization with the European Union legislation

Croatia's efforts to harmonize its legislation with the European Union (EU) acquis in the frame of the accession process to the EU led to a stronger legal framework for environmental protection and sustainable development. In 2010, Croatia successfully concluded negotiations for Chapter 27-Environment, and established transitional agreements related to heavy investment areas including air quality, climate change, waste management, water quality, industrial pollution, risk management and chemicals. Significant legislative gaps remain in some environmental domains, such as soil protection. Few provisions on soil protection can be found in forestry and agricultural legislation.

Environmental protection

The Environmental Protection Act (EPA) was promulgated in 1994 and amended in 1999. In 2007, the Croatian Parliament adopted a new EPA. The 2007 EPA includes obligations to improve the quality and implementation of environmental impact assessments (EIA), introduce strategic environmental assessments (SEA), reinforce public participation in environmental matters, ensure access to environmental information, and strengthen integrated industrial pollution prevention and control (IPPC). The act also introduced decentralization of administrative responsibilities for environmental protection. To date, the EPA is supplemented by 17 implementing regulations, 1 decision and 25 ordinances.

A new EPA was adopted in July 2013 to provide an improved basis for further harmonization of national environmental legislation with the EU acquis. The 2013 EPA (OG 80/13) is based on the 2009 Sustainable Development Strategy (OG 30/09) and incorporates the provisions of a number of EU directives. In particular, it:

- Introduces the environmental permit (possession of the permit is no longer obligatory prior to issuing the location permit for installation, but prior to putting the installation into operation);
- Improves the existing EIA procedure related to screening (i.e. assessing the need for the EIA);
- Further improves the system for prevention and remedying of environmental damage;
- Improves the system for granting authorizations for professional work in environmental protection;
- Improves the system for environmental inspection;
- Introduces the concept of integrated management of marine and coastal areas.

Croatia has made progress in terms of fulfilling several main obligations in the 2007 EPA, such as: the adoption of the National Sustainable Development Strategy in 2009; the establishment of new organizational units responsible for environmental protection in counties and major cities; the adoption of implementing regulations to strengthen EIA and of environmental protection programmes for a range of counties, the City of Zagreb and other major cities.

However, some of 2007 EPA provisions remain unimplemented, such as the adoption of the new eight-year National Environmental Protection Plan (NEPP), which would identify new priority environmental protection goals at national level, define implementation measures, set implementation deadlines and identify responsible authorities.

Air protection

The 2011 Air Protection Act is the primary legislative act regulating air protection, climate change mitigation and adaptation, ozone layer protection and industrial pollution. The 2011 Act was crucial in establishing a legal and institutional framework to implement the emissions trading scheme for installations and aviation, and to achieve

the 2020 greenhouse gas emissions target for sectors not included in the EU trading scheme (agriculture, services, transport, households and small industrial plants). It also created a legislative basis for regulating geological storage of carbon dioxide in an environmentally safe manner, and for strengthening air quality, greenhouse gas emissions monitoring, and administrative and inspection supervision. To date, the Act is accompanied by 9 implementing regulations, 9 decisions and 9 ordinances.

The Air Protection Act sets out the competences and liabilities for: air protection; air improvement and protection planning documents; air quality monitoring and assessment; measures for prevention and reduction of air pollution; air quality reporting and data exchange; the issue of permits for monitoring air quality and emissions into the air; air protection information systems; air protection funding; and administrative and inspection supervision.

Croatia made an important step towards fulfilling the Act's obligations by joining the third phase of the EU ETS in January 2013. Transitional periods have been agreed with the EU for participating in the EU ETS for aviation (2014), modernizing existing IPPC installations (2017), and limiting emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations (2015). The permit process for existing installations has been slow and funding for upgrading such installations remains insufficient.

Nature protection

The 2003 Nature Protection Act was decisive in establishing a strong and comprehensive legislative framework for protecting flora and fauna, maintaining biological and landscape diversity, preserving ecological stability, improving the disturbed natural balance and restoring its regeneration capabilities. In 2005, Croatia adopted a new Nature Protection Act to incorporate the provisions of all relevant MEAs and EU directives.

The amendments in 2008 and 2011 inter alia enlarged the earlier nature protection framework with regard to the protected natural values, aiming at the preservation of the overall biological and landscape diversity. The details of the implementation of the Act have been specified in 18 regulations, 23 decisions and more than 30 ordinances relating inter alia to the management of protected species and areas, including national and regional parks, nature parks and reserves. A new Nature Protection Act was adopted in July 2013 (Chapter 8).

Waste

The 2004 Waste Act, amended in 2006, 2008 and 2009, establishes a comprehensive legal framework for waste management. It covers the principles and aims of management, planning documents, authorities and responsibilities related to management, costs, information systems and requirements for facilities where waste management shall be carried out, methods for performing activities, transboundary transport of waste and concessions, and supervision of waste management. The implementation of the act is currently regulated by 2 regulations, 5 decisions and 192 ordinances.

While Croatia has made major efforts to fulfil the Waste Act obligations, the progress on the ground has been slow inter alia due to heavy investment needs. Transitional agreements have been drawn up with the EU to remediate existing landfills and build new waste management centres (2018), and concerning the amount of biodegradable municipal waste to be landfilled (2020), and the amount of waste landfilled in existing non-compliant landfills (2017). Although the Waste Act is interlinked with a large number of sectoral laws, Croatia's efforts to consolidate them have to date been somewhat insufficient.

The Act on Sustainable Waste Management, which replaces the Waste Act, was adopted in July 2013 and entered into force 23 July 2013, bringing Croatian legislation further into line with the EU acquis.

Water

Water protection and management, including water supply and wastewater disposal, is regulated by the 2009 Water Act OG 153/09, 63/11, 130/11 and 56/13) and the 1995 Water Management Financing Act, last amended in 2013 (OG 153/09, 90/11 and 56/13), alongside accompanying secondary legislation. The Water Act regulates the activities and organization of water management and protection, and public water supply and public sewerage activities. It sets out a comprehensive institutional organization of the water utility sector. This act replaces the former Utility Management Act, and thus supersedes provisions related to drinking water supply, sewerage and wastewater treatment, transferring the jurisdiction of public water utilities to the Ministry of Agriculture, Water Management Directorate. The Water Management Financing Act defines water management revenues, the most significant of which are water charges (chapter 5).

Reforms of the water sector are proceeding, and some key commitments have been met, such as the preparation and adoption of the River Basin Management Plan. Investments in infrastructure have been insufficient.

Marine environment protection

The 2011 Regulation Establishing a Framework for Action on Marine Environment Protection (OG 136/11) aims at defining conditions for the elaboration, development, implementation and monitoring of the Marine Environmental Protection Strategy (Marine Strategy) for achieving and maintaining good marine environmental status by 2020. The regulation inter alia determines the goals, scope, and responsibilities of marine environment protection, for which the Ministry of Environmental and Nature Protection represents the central authority. The act previewed the finalization of a document to make an initial assessment of the marine environment, the characteristics to be determined for good environmental status, and a set of environmental targets including related indicators by 2012.

In 2011, a first preparatory document on Marine Strategy (initial assessment of the state of and pressure on the marine environment in the Croatian part of the Adriatic Sea) was prepared and adopted by implementing bodies defined by the Regulation, and others are expected to be finalized by the end of 2013. Based on the preparatory documents, the Regulation also envisages so-called Action Programmes, which include establishing a monitoring and observation system of the marine environment (by 15 July 2014) as well as a programme of measures (by end 2015). Work on the monitoring and observation system was initiated in early 2013 as part of the second phase of the Coastal Cities Water Pollution Control Project funded by the IBRD loan 7640/HR and is due for completion by the end of the project (September 2014).

Chemicals

The 2005 Chemicals Act, amended in 2008 and 2011, is the key legislative act in terms of regulating chemicals management. It is currently accompanied by 14 ordinances. The act is also complemented by the 2007 Act on Biocidal Products (amended in 2008 and 2011) that sets out the legislative frame for management of biocidal products. In 2013, the 2005 Chemicals Act was replaced by a new Chemicals Act to further strengthen the legal and institutional framework for the safe management of dangerous chemicals.

While Croatia has made some progress in terms of fulfilling its obligations, the way that responsibilities are organized has hindered a unified approach to solving chemicals management questions. The mandates of several institutions involved in chemicals management, such as the Ministry of Environmental and Nature Protection, have been defined and formalized through legislation and the National Safety Chemicals Strategy. A system for monitoring chemical substances and mixtures exists in the form of a registry at the Croatian Institute for Toxicology and Antidoping, and another institute takes care of monitoring poisonous substances. Administrative capacity to manage chemicals and biocidal products remains insufficient. However, the recent establishment of a new department for chemicals and biocidal products within the Ministry of Health has been an important step towards ensuring the implementation of both acts.

Noise protection

The 2009 Noise Protection Act (OG 30/09, 55/13) was decisive for regulating an acoustic environment conducive to protecting human health and the biodiversity of ecosystems. The act determines measures to avoid, prevent and reduce adverse effects of noise on human health and the environment. It inter alia obliges cities and towns with more than 250,000 inhabitants to elaborate strategic noise maps and action plans. To date, the Ministry of Health has received five strategic noise maps: i.e., Split (agglomeration), Rijeka, BINA Istra (motorway transport), highway Rijeka-Zagreb and highway Zagreb-Macelj. Furthermore, four legal persons have been authorized to carry out professional sound design and predict noise levels. Some progress has been achieved in terms of institutional strengthening through the establishment of the Department of General Use Items and Noise Protection within the Ministry of Health.

An IPA-funded project, "Technical Assistance for Development of National Environmental Noise Strategy for the Republic of Croatia", was started in October 2011 to support the implementation of the Environmental Noise Directive 2002/49/EC in Croatia. A draft National Environmental Noise Protection Strategy has been prepared within the project.

Genetically modified organisms

The 2005 Act on Genetically Modified Organisms (GMO), amended in 2009 and 2013, replaced the biotechnology-regulating provisions of the Act on Protection of Nature. The act regulates the import,

shipment, production, usage and sale on the market of genetically modified crops or biotechnology products and in particular biosafety activities that are relevant to the introduction of GMOs into the environment. The act bans the release of GMOs in protected areas and their buffer zones, in organic farming areas and those important to ecotourism. This provided a legal tool for all counties to effectively declare themselves GMO-free. The act also includes the obligation to elaborate a national strategy on the coexistence of genetically modified crops and conventional and organic agricultural production, but this has not yet been adopted.

Protection against light pollution

In some areas, Croatian national legislation goes beyond EU requirements. The 2011 Act on Protection against Light Pollution, for example, regulates the protection of the environment and biodiversity from the adverse effects of light pollution and promotes the rational use of natural resources and energy. The act determines the principles and stakeholders in light pollution protection, the procedures for determining standards for regulating lighting to reduce energy consumption, and standards and rules relating to light pollution, construction planning and lighting maintenance. It also includes the obligation to account for light pollution in SEAs.

Environmentally related provisions in sectoral laws

Since 1999, the number of environment-related provisions in sectoral legislation such as agriculture, energy, industry, tourism and transport, has increased. Sectoral legislation typically makes cross-reference to relevant environmental legislation and defines environmental goals and requirements for subordinated sectoral legislation and policies. However, environmental provisions in sectoral legislation are largely at conceptual rather than implementing level. Only some sectoral legislation, such as the Energy Act, clarifies the competences and roles of environmental authorities in reviewing and enforcing sectoral legislation and policies.

An important step towards making sectoral laws more sensitive to environmental concerns was the adoption of the 2011 Act on Regulatory Impact Assessment (RIA) and its 2012 implementing regulation. Until 2009, there were only a few provisions in the Rules of Procedure of the Government stipulating obligatory RIAs on the economy and – if necessary – the evaluation of financial, social impacts and ecological impacts. The

2011 Act established a new system for analyzing the positive and negative impacts of regulations, and made equally binding the evaluation of impacts on the economy, financial impacts and the evaluation of impacts on social welfare and environmental protection. In addition, it anticipates consultations with the public and interested parties. RIA implementation in terms of evaluating regulations' environmental, economic and social impacts is guided by the RIA Guidelines, which are publicly available.

Implementation

While there has been significant strengthening of the legal framework for environmental protection and sustainable development since 1999, Croatia has been slow in terms of implementing new legislation, in particular at subnational level. This has been particularly the case in areas demanding high infrastructure investments, such as air protection, waste and water management. This is primarily linked to insufficient State budget allocations and low financial investment due to the social and economic situation in Croatia and the global economic and financial crisis. Weak implementation of environmental legislation at local level is also linked to insufficient administrative capacity in particular on chemicals, climate change, IPPC, nature protection and noise.

The Government has made insufficient efforts to ensure regulatory harmonization of the existing and new environmental and sectoral legislation and establish a stable mechanism of regulatory improvement that allows wide consultation within the Government and with other stakeholders. For example, the reform of the environmental legal system is largely based on ad hoc legal fixes.

1.2 Policy Framework

National Sustainable Development Strategy

The 2009 National Sustainable Development Strategy (NSDS) for the period 2009-2019 represents the highest-ranking policy document for environmental protection and sustainable development at national level. The NSDS was critical to establishing long-term goals related to economic and social development towards sustainable development. It defines guidelines for long-term actions and for the horizontal and vertical coordination of policies by defining goals and determining measures in eight key cross-sectoral areas. The NSDS is to be implemented through action plans.

However, NSDS implementation has been insufficient. To date, Croatia has adopted only one action plan: the Action Plan for Education for Sustainable Development. The Ministry of Environmental and Nature Protection has initiated three further action plans: the new National Environmental Protection Plan (NEPP), the Action Plan for Sustainable Consumption and Production (APSCP) and the Action Plan for Protection of the Adriatic Sea, Coastal Area and Islands. Work on the latter was stopped to avoid duplication with the Marine Protection Strategy and the corresponding new Intervention Plan in Case of Sudden Sea Pollution, both currently being drawn up. The Ministry has commissioned an external advisory body to draw up the NEPP and APSCP, resulting in complex and overambitious drafts that are now being examined to ensure their feasibility. No coordination mechanisms are in place to promote synergies, reduce trade-offs between challenges and coordinate measures to tackle them. All in all, the NSDS has thus proved to be an insufficient policy framework for ensuring coordinated implementation and monitoring of the interdependent environmental and sectoral strategies and plans in place, making coherent action difficult.

National Environmental Strategy

The 2002 National Environmental Strategy (NES) was adopted together with the National Environmental Protection Plan (NEPP) in 2002 to provide overarching strategic documents for environmental protection. In 2009, the NES was replaced by the NSDS, which puts national strategic environmental goals for the ten-year period into a context of sustainable development. Until the adoption of a new NEPP, the 2002 version continues to represent the central policy document for environmental and sustainability action at national level

Coastal and Marine Management Strategy

The Ministry of Environmental and Nature Protection, having in mind the obligation to prepare a Coastal and Marine Management Strategy (Marine Strategy) and a variety of policies to deal with managing coastal and marine environments and define the coastal zone according to the ratified Protocol of the Barcelona Convention on Integrated Coastal Zone Management in the Mediterranean (e.g. its land and sea components), linked within the 2013 EPA the obligations arising from the ICZM Protocol and the Regulation Establishing a Framework for Action of Croatia in the Field of Marine Environment Protection (OG 136/11). This thus prepares a unique

national strategic document for the Croatian Adriatic Region that would integrate both the ICZM and the Marine Strategy including climate change adaptation issues, taking into account the Water Management Strategy and relevant plans.

National Environmental Protection Plan

The NEPP adopted in 2002 has not been replaced by a new eight-year NEPP as prescribed in the 2007 EPA. In practice, the 2002 NEPP continues to represent the central policy document for environmental and sustainability action at national level. It outlines national priority goals, principles, investments, regulations, and organizational priorities and criteria for prioritizing plans of action. All in all, the NEPP encompasses 750 measures in 16 thematic chapters covering a wide range of sectors (industry, mining, energy, agriculture, forestry, tourism, transport, hunting and fishery) as well as cross-sectoral issues (air quality management, water management, management of soil and forests, waste management, noise protection, biodiversity, landscape protection and geological heritage, coastal and island management, urban and rural areas). Each measure in the NEPP identifies goals, measures, target groups, responsible institutions, implementation deadlines (priority projects to be implemented within 0-2 years, 2-5 years, 5 or more years), and interdependencies with other action plans as well as with EU and MEA requirements, and possible financial resources. The NEPP also defines strong governance mechanisms for implementing and monitoring action plans in a coherent and sustainable way, including monitoring and information instruments, science and development, integration instruments, awareness-raising and participation instruments, education, economic and financial instruments, and as inspectional supervision.

National state of environment reports

Croatia has a track record in national environment reporting, covering different time periods and aspects of national priorities at the time. However, due to the EU accession process and to harmonize with the reporting cycles of the European Environment Agency (EEA), it was decided to establish a legal obligation to elaborate national state of environment reports (SoER) every four years, based on the national thematic indicators, which closely comply with EEA indicators. The SoER for 2005-2008 was published very late in 2012. The CEA finalized the draft in 2010 and the Government adopted the report in June 2011, after which it was put on the agenda of the Croatian Parliament. However, due to the parliamentary elections in December 2011, the

procedures had to be repeated with the new Government and Parliament.

The 2012 SoER offers exhaustive insight into progress on achieving goals and implementing measures outlined in the main sustainable development and environmental protection documents. However, in practice it has had limited influence on decision-making. The SoER also included limited just-in-time knowledge due to the long delay in its adoption. The SoER for 2009-2012 has not been finalized.

Strategy and Action Plan for the Protection of Biological and Landscape Diversity

To implement the Nature Protection Act, in 2008 the Croatian Parliament adopted the Strategy and Action Plan for the Protection of Biological and Landscape Diversity of Croatia. This is a fundamental document for nature protection, laying down long-term objectives and guidelines for conserving biological and landscape diversity and protecting natural values, and including implementation methods. The Nature Protection Act makes it obligatory to analyze objectives and guidelines and implement an action plan every five years, resulting in possible revisions to the Strategy. Croatia is currently in the process of preparing a report on the State of Nature that will serve as a basis for preparing a revision of the Strategy and Action Plan, scheduled for 2014 (Chapter 8).

National Waste Management Strategy

Waste management system and priorities are determined in the 2005 National Waste Management Strategy, which assesses the situation, identifies problems and obstacles, and sets the main waste management objectives for 2005-2025 (Chapter 6). The Strategy is implemented through the 2007 Waste Management Plan valid for 2007-2015 that sets out the objectives of the Waste Management Strategy: (i) establish an integrated waste management system; (ii) rehabilitate or close landfills; (iii) rehabilitate "hot spots"; (IV) establish regional and county centres for waste management and pretreatment of waste before final disposal or land filling; and (v) computerize the waste management system. The Plan serves as a framework document for waste management plans and for setting up individual projects that fit into the country/regional integrated waste management system. Croatia is currently preparing a new waste management strategy that corresponds more closely to EU requirements and legal obligations in the waste management area.

Water Management Strategy

Water management policy is determined by the 2008 Water Management Strategy, the core national long-term strategic water management document. This policy is critical to establish a unified water management policy and an integral and coordinated approach to improving the water system in line with international commitments. It defines strategic goals, establishes current and future needs and services, and identifies how they might be met through management plans for four water districts: water district of Sava basin and water district of Danube and Drava river basins in Black Sea Basin; water district of river basins in Istria and Primorje and water district of basins in Dalmatia in Adriatic Basin.

The 2009 Water Act establishes two river basin districts for the management of river basins on the national territory of Croatia: the Danube River Basin District, and the Adriatic River Basin District. Transboundary river basins also belong to international river basin districts. Any part of an international river basin district that is located on the territory of Croatia is managed by Croatian Waters. Croatia developed and published its river basin management plan before EU accession.

Climate and Air Protection Policies

Air quality and climate change protection represent the third national priority area according to the NES. To meet this challenge, in 2008 Croatia adopted the Air Quality Protection and Improvement Plan for 2008-2011, the National Plan for the implementation of the Stockholm Convention on Persistent Organic Pollutants, the plan on reducing emissions of sulphur dioxide, nitrogen oxides and particulate matter from major combustion plants and gas turbines on Croatian territory, the programme for monitoring the quality of liquid oil fuels on an annual basis, the 2009 programme for gradual emissions reduction of certain pollutants in Croatia up until the end of 2010, and the 2009 Plan on the Allocation of Greenhouse Gas Emission Quotas.

Since 2012, Croatia has been working on establishing a framework to prepare its low-emission development strategy (LEDS), a new national air quality protection and improvement plan for 2012-2017, and an action plan to reduce ozone pollution. The country's bottom-up, trans-sectoral, multi-stakeholder approach has set new procedural standards in terms of transparency, participation and horizontal integration.

Croatia to date does not have a climate change adaptation strategy, although the process of preparing the Impact, Vulnerability and Adaptation Strategy to Climate Change under the IPA programme started in 2008. As part of the IPA, a Transition Facility Project was proposed in 2012 and received preliminary approval by the European Commission. The project for adaptation to climate change refers to particular sectors, preparing scenarios on impacts, vulnerability and adaptation, measurement assessments, sector prioritization and adaptation measures, and adaptation strategy preparation.

Other environment-related policy documents

The 2005 National Environment Instrument for Structural Policies for Pre-Accession (ISPA) strategy inter alia covers waste, water and air protection management, including an indicative list of priority projects selected in line with the general criteria for ISPA projects as well as specific criteria. The Operational Environment Programme for 2007-2013 aims at developing environmental infrastructure and public services for municipal waste management and disposal, drinking water supply, municipal wastewater and water resources treatment. However, a number of policy initiatives launched during the review period to address individual environmental components have not been adopted, including inter alia the National Strategy for Coexistence of Genetically Modified Crops with Conventional and Organic Agricultural Production, the National Noise Protection Strategy and the Noise Protection Action Plan.

Subnational environmental policies

The main strategic documents for environmental protection at subnational level are the four-year regional and local environmental protection programmes (EPPs) outlining conditions and measures for environmental protection, priorities, authorities and the sources for its funding. According to the 2007 EPA, EPPs are to be adopted by the counties, the City of Zagreb and all major cities within six months of the adoption of the NEPP, subject to the prior approval of the Ministry of Environmental and Nature Protection. However, as the new NEPP stipulated in the 2007 EPA has not yet been elaborated, counties and major cities have not had sufficient incentive to adopt or revise their EPPs.

In total, 17 counties and the City of Zagreb have adopted EPPs since 2007. However, the majority have expired and not been renewed. Two counties

(Međimurje and Požega-Slavonia) have not adopted EPPs to date. All in all, only three counties have EPPs that are still in force: until 2014 for Dubrovnik-Neretva and Sisak-Moslavina counties, and until 2016 for Šibenik-Knin county. Only two major cities have adopted EPPs to date: Osijek adopted its EPP in 1999, and Sisak adopted its EPP in 2009 and amended it in 2013.

The Sisak EPP will remain in force until 2016. If envisaged in the county's EPP, cities or municipalities may also adopt a programme for their territory. To date this has been the case in five municipalities. EPPs are in force in the following cities: Ivanić-Grad (until October 2013), Dugo Selo (until November 2013), Sveti Ivan Zelina (2014) and Zaprešić (until 2017). Kostrena was the only municipality to develop an EPP that remained in force until 2012.

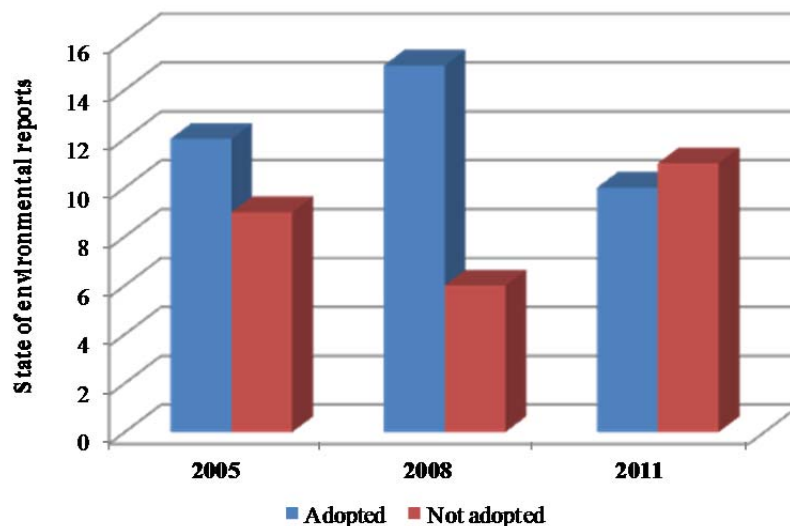
According to the 2007 EPA, SoERs must be prepared by local and regional governments, the City of Zagreb and other large towns covering a four-year period. The reports monitor the implementation of the environmental protection programmes adopted at local and regional level after being brought into line with the NEPP. In 2005, 12 counties adopted a four-year report, after which clear progress was made (Figure 1.1). Regarding large towns' statutory obligation to prepare reports, of 22 large towns, only Sisak prepared a report in 2009.

Major progress has been achieved in terms of adopting strategic documents in the waste sector. By April 2013, all 20 counties apart from the City of Zagreb had adopted waste management plans in accordance with the National Waste Management Plan. In practice, 17 out of 22 major cities, and 48 cities and 176 municipalities have their own waste management plans. In 2008, only seven municipalities had such plans. However, their conformity with the National Plan remains questionable. Local and regional governments have not sufficiently complied with the legally prescribed deadlines for fulfilling individual obligations relating to municipal waste disposal. In particular, there is a need to accelerate the construction of single regional waste management centres (RWMC), financed by local governments, the Environment Protection and Energy Efficiency Fund (EPEEF) and EU funds. In 2012, construction started in two of Croatia's 21 counties. The EU has granted RWMCs a transitional period to January 2019 to bring landfills into compliance with accession requirements (Landfill Directive).

Photo 1.1: The city of Dubrovnik, a World Heritage site



Figure 1.1: State of environment reports adopted and not adopted by the counties and the City of Zagreb in 2005, 2008 and 2011



Source: CEA, 2012.

The relatively low implementation level of waste management plans is due to a number of factors, including a shortage of adequate financial resources and skilled staff at all Government levels, a lack of coordination between Government agencies and regional and local governments, and insufficient interaction with public and private groups (Chapter 6).

Progress has been made in marine contingency planning. In 2008, the Croatian Government adopted a new Contingency Plan for Accidental Marine Pollution (OG 92/08) in accordance with the Prevention & Emergency Protocol of the Barcelona Convention, and the Agreement on the Sub-regional Contingency Plan for Prevention of, Preparedness for and Response to Major Marine Pollution Incidents in the Adriatic Sea. All seven coastal counties have

adopted county contingency plans in accordance with the national plan.

The counties, the City of Zagreb and major cities have not yet fulfilled their obligation to adopt air quality programmes and plans (if pollution level in the air exceeds thresholds or targets in a given zone) and short-term action plans (if there is a risk that pollution levels will exceed alert thresholds) as anticipated in the 2011 Air Quality Act. With the aim of fulfilling these obligations, the project "Support for the preparation of a national action plan to reduce particulate matter (PM) and nitrogen oxides (NO_x) in Croatia (Directive 2008/50/EC)" was terminated in 2012 and led to the drafting of short-term action plans for the cities of Kutina, Sisak and Split.

Sectoral policies with environmental impact

Since 1999, Croatia has adopted a range of sectoral policies with direct and significant impacts on the environment. They include the 2006 National Health Care Strategy for 2006-2011, the 2009 Energy Strategy, the 2010 Regional Development Strategy, the 2011 Strategy for Broadband Development, the Strategy of Rural Development for 2012-2014 and the 2012 National Health Care Strategy for 2012-2020. Other national strategic documents and implementation plans establishing systems and priorities in specific environmental areas include the 2002 National Agricultural and Fishery Strategy, the 2003 National Forest Policy, the 2008 National Strategy for Chemical Safety and the 2008 Intervention Plan in Case of Accidental Sea Pollution. Although there has been some progress on the ground, the mainstreaming of environmental concerns in sectoral policy documents often remains at a conceptual level, while little integration can be seen at implementation level. Improving the implementation and integration of the principle of environmental protection in sectoral strategic documents thus remains one of the priority challenges.

1.3 Strategic Environmental Assessment

Legislative framework

The 2007 EPA establishes the first comprehensive legal framework for SEA. The 2008 Regulation on SEA of Plans and Programmes (SEA Regulation) and the Ordinance on the Committee for SEA further specify SEA implementation. At national level, the SEA screening procedure and SEA procedure are carried out by the competent ministry for the sector pertaining to the adopted plan or programme. Administrative bodies competent in environmental

protection in the county or the City of Zagreb carry out SEAs of plans and programmes at regional level.

The SEA procedure must be carried out prior to establishing the final proposal of the plan or programme. It is based on a strategic impact study undertaken by an external authorized person selected by the competent body. The competent body also appoints an advisory expert committee that gives its opinion on the completeness and expertise of the strategic impact study prior to its submission for public debate. The participation of the Ministry of Environmental and Nature Protection in the committee is mandatory for SEA procedures at national level, and optional for regional plans and programmes.

Implementation

Pursuant to the 2007 EPA, the SEA procedure is mandatory for all plans and programmes on agriculture, forestry, fisheries, energy, industry, mining, transport, telecommunications, tourism, and waste and water management adopted at national and regional level, for counties' spatial plans and the National Physical Plan. In case of amendments to plans and programmes, an SEA screening procedure must be carried out to determine whether a comprehensive SEA procedure is necessary. However, this is not the case in practice.

An SEA has been carried out for four strategic documents: the Operational Environment Programme for 2007-2013, the Operational Programme for Transport for 2007-2013, the Operational Programme for Regional Competitiveness for 2007-2013 and the River Basin Management Plan for 2007-2013. In all four cases, the competent ministries initiated SEA procedures that are still in progress. SEA procedures are complete for all except the Operational Programme for Regional Competitiveness.

At county level, SEA screening procedures were carried out for seven county spatial plans and for the waste management plan of the City of Zagreb. Only in four cases have counties decided to initiate an SEA procedure. These are amendments to the spatial plans of Istria County (SEA procedure since 2010), Primorje-Gorski kotar County (since 2011), and Vukovar-Srijem County (since 2012), and the Waste Management Plan of the City of Zagreb by 2015 (since 2012). To date, only the SEA procedure for Primorje-Gorski kotar County has been completed. Despite legal obligations, no SEA screenings were conducted for the waste management plans of Zadar County (2009-2017), Lika-Senj County (2010-2018) and Zagreb County (2011-2019).

This low SEA implementation is caused by several factors. First, SEA is mandatory only for plans and programmes and not for strategies. Second, even for plans and programmes, the weak role played by the Ministry of Environmental and Nature Protection (no veto right) in the SEA screening procedure and SEA procedure hinders SEA implementation. While competent bodies are obliged to ask the Ministry for its opinion on whether the SEA procedure is necessary and the SEA's quality, they do not have to obtain its approval. Consequently, four counties decided not to implement an SEA procedure for their spatial planning despite a recommendation from the Ministry to do so.

The insufficient methodological framework for carrying out an SEA constitutes another reason for the implementation gap. The 2008 SEA Regulation establishes criteria for determining the likely significance of impacts on the environment, but merely lists the descriptive characteristics of plans, programmes, effects and areas that may be affected by the implementation of the plan or programme, and fails to determine quantitative criteria with threshold values for evaluating the significance of the impacts of plans and programmes on the environment in a unified and systematic way.

In addition, the prescriptions for the strategic impact study in the SEA Regulation only include a list of example areas (e.g., air, biodiversity, human health and population) that could be significantly affected by programmes and plans, and fail to establish threshold values for determining the significance of these impacts. The evaluation of the need for an SEA, and the assessment of the significance of impacts on the environment are thus a highly subjective. This makes it difficult for the Ministry of Environmental and Nature Protection and the public to challenge the results of an SEA screening and the content of strategic impact studies submitted by the competent authorities.

Capacity building measures for SEAs have been insufficient. The Ministry of Environmental and Nature Protection has failed to develop support tools such as guidelines or a handbook for SEA practitioners. The 2003 SEA Guidelines are not coherent with the new legislation on SEAs. To date, no comprehensive training on SEAs has been organized for members of the central administration. However, four two-day SEA training courses were organized for county representatives in Split, Rijeka, Varaždin and Osijek in 2010. With the new EPA, significant improvements are expected. In 2013, two roundtables were held in Zagreb for key stakeholders, another two are planned for Zadar and Split at the

end of 2013, and three more in 2014 (Zagreb, Rijeka and Osijek).

Public participation

A central feature of the EPA and the 2008 Regulation on Information to and Participation of the Public in Environmental Matters is the obligation to inform the public and ensure public participation in SEA plan and programme procedures. According to the 2007 EPA, the time period for informing the public should be no less than 30 days. In SEA plan and programme procedures, the public has the right to participate in developing a strategic impact study, determining its content, and in a public debate on the strategic impact study and the draft proposal of the plan or programme. SEAs of physical plans are an exception, since public participation is regulated in accordance with the provisions of the legislation governing physical planning. Public examination has to last at least 30 days.

Implementation by ministries and counties of legislative provisions regarding public information and participation in SEA procedures has been poor. To date, no discussion report or information on how opinions, proposals and objections submitted in the public debate have been incorporated into SEAs have been published. In addition, no centralized information platform exists on ongoing and completed SEA procedures at national and subnational levels.

1.4 Green Economy Initiatives

Policy frame

The 2011 Strategic Guidelines for Green Economic Development were developed to raise sectoral ministries' awareness of the new concept of a green economy and inform them about financial instruments for implementing green economy initiatives. They also include a set of action plans and strategic documents to be adopted by the ministries to create the conditions for a green economy. The regulated community and State-owned companies are invited to develop green economy action plans. However, guidelines are not suitable instruments to set deadlines, time lines or concrete goals. Moreover, the distribution of responsibilities in the Guidelines is partly outdated due to a reform of ministerial competences after the parliamentary elections in 2011. Thus, activities to promote the green economy remain highly dispersed, and no institutional mechanisms are in place for coordinating and monitoring green economy initiatives.

Case analysis

Croatia lacks effective governance mechanisms for coordinating inter-sectoral activities and investing in a green economy, and a clear strategic action plan for greening the economy; however, a number of green economy initiatives have been started since 1999. According to its annual financial reports to the Parliament, since 2003 the Environmental Protection and Energy Efficiency Fund (EPEEF) has provided a range of loans, grants and subsidies to stimulate green initiatives. For example, from 2004-2010, a total of €3.2 million were disbursed to finance 78 projects in the sustainable building sector. All projects were related to improving the energy efficiency of buildings with regard to lighting and heating systems, energy-efficient building envelopes, substituting the primary energy source in boiler plants, and optimizing combustion systems.

Since 2006, EPEEF has also financed a system for separate collection and recycling of packaging waste. EPEEF collects its revenue from fees paid by producers/importers that introduce packaging into the market. These fees are used by EPEEF to recover (or dispose of if recovery is not possible) waste collected by an authorized collector, which dispatches PET, aluminium and tin (Al/Fe) cans and glass packaging to waste packaging management centres. This has led to improvements in packaging waste collection. More than 4,000 green jobs were created in the waste management system between 2006 and 2011, generating interest among economic entities to establish new recycling plants and create further jobs.

In 2011, a budget of €17.66 million was earmarked for projects and programmes on energy efficiency and renewable energy. They were inter alia used to finance the implementation of the 2010 National Energy Efficiency Programme for 2008-2010. One of the flagship projects is the 2007-2013 UNDP COAST project, aimed at promoting conservation and sustainable use of biodiversity on the Dalmatian Coast. The project initiated the Green Business Support Programme in 2008 to help small businesses preserve the natural wealth and biodiversity of Dalmatia, promote sustainable economic development of rural areas and create new jobs. Partners that directly support green entrepreneurs included four Dalmatian counties (Zadar, Šibenik-Knin, Split-Dalmatia, Dubrovnik-Neretva) and their development agencies, together with the Splitska and Jadranska banks. The potential and importance of green business for Dalmatia's rural development was illustrated by 97 entrepreneurial projects totalling 169 million HRK. Since 2008, 300 project applications have been made from the territory of Dalmatia.

Support from the Green Business Support Programme is targeted at: (i) direct loans via the loan-guarantee fund, (ii) financial and technical assistance to implement a green business project, and (iii) technical and financial assistance to prepare project proposals to be applied under other national and international support programs. In 2013, the UNDP published the publication "Nature and People Together", outlining 31 best cases of green entrepreneurship in rural areas of Dalmatia.

In 2010, the Croatian Business Council for Sustainable Development initiated the National Network for Developing Corporate Social Responsibility (CSR) together with its partner organizations: Global Compact Croatia, the Croatian Chamber of Economy, the Croatian Employers' Association, the Croatian Trade Union Association and the Faculty of Economics and Business of the University of Zagreb. The initiative established a network to support the business sector in taking CSR action and a web-based CSR database. It organizes the annual CSR Index Award and in 2012 it published a "Selection of Best Cases of CSR" comprising 20 cases in Croatia. They inter alia include a partnership between Banco Popolare Croatia and Alliance for Energy Zagreb created in 2011 to grant 'green credits' to small- and medium-sized enterprises and citizens to encourage energy efficiency improvements and use of renewable energy sources.

Domestic and foreign private capital plays an increasingly important role in promoting the green economy, especially in building, developing and transferring clean technologies. The green economy has been recognized as an important priority area for securing EU funds and triggering domestic and foreign investment in Croatia. This has also been reflected in documents such as the Environmental Operational Programme 2007-2013 to use IPA, which builds on previous investments and capacity-building initiatives funded by earlier EU programmes such as CARDS, ISPA and Phare.

1.5 Institutional Framework

Ministry of Environmental and Nature Protection

Since 1999, the national environmental authority for environmental protection and sustainable development has been subject to institutional restructuring. In 2000, its status was upgraded from a State Directorate for the Protection of Nature and Environment to a Ministry of Environmental Protection and Physical Planning. This change

extended its responsibilities to physical planning and inspections in the area of construction. After its restructuring into the Ministry of Environmental Protection, Physical Planning and Construction in 2003, responsibility for nature protection was moved to the Ministry of Culture. When the former was split into the Ministry of Environmental and Nature Protection and the Ministry of Physical Planning and Construction in 2011, the Ministry of Environmental and Nature Protection regained its responsibility for nature protection. Currently, it is responsible for environmental protection and sustainable development, including inter alia nature protection, protection of environment components (air, flora and fauna, sea, soil and water) in their overall interaction, and monitoring and preventing the pollution of air, soil, the marine environment and water.

The last restructuring of the Ministry in 2011 represents an important step towards reducing the fragmentation of responsibilities for environmental protection and sustainable development. However, it has also had negative effects with respect to administrative supervision.

From 2000 until 2011, the Department for Complaints and Administrative Supervision within the Ministry of Environmental Protection and Physical Planning regularly controlled the quality of acts and decisions and their implementation at subnational level and proposed measures to prevent irregularities in terms of national legislation requirements. The Department thereby made regular spot checks in counties in line with the Ministry's annual plan. Since the Ministry's split in 2011, this competence has moved to the Independent Service for Legal Affairs at the Ministry for Environmental and Nature Protection, which currently employs six staff. Due to low administrative capacity, the Service has not been able to fulfil this responsibility.

At present, the strategic management of the Ministry of Environmental and Nature Protection encompasses the Minister, the Deputy Minister and three assistant ministers heading the directorates for Inspection Affairs, Nature Protection, and Environmental Protection and Sustainable Development. The Ministry also includes the General Secretariat, the Independent Services for Internal Audit, the Independent Service for Legal Affairs, and the Independent Sector for the EU (Figure 1.2).

In order to adapt the organization and operation of the Ministry of Environmental and Nature Protection to the increased scope of obligations pursuant to EPA and new EU requirements, the 2011 Regulation on its internal organization previews expanding its staff to

336 employees. However, the efforts of the Ministry for Environmental and Nature Protection have been insufficient with respect to administrative capacity strengthening. From December 2012 until April 2013, the number of employees only increased from 268 to 282. The total number of staff was 54 less than planned. In particular, the Independent Sector for the EU, the Directorate for Nature Protection and the Directorate for Inspection Affairs each lacked 12 employees.

Sectoral ministries

Despite substantial changes in the organizational structure and scope of work at the Ministry of Environmental and Nature Protection, responsibilities for environmental protection and sustainable development remain fragmented. Many areas of environmental and nature protection come under the responsibility of other sectoral ministries and State institutions.

Activities related to water management regulation, inspection and appeal are conducted by the Ministry of Agriculture. The Ministry is also responsible for protection of agricultural lands, animal waste management and forest conservation. A special water management role is allotted to the National Water Council, a body appointed by Parliament. It discusses legislation, the financing system, the Water Management Master Plan and various requirements arising from the water system.

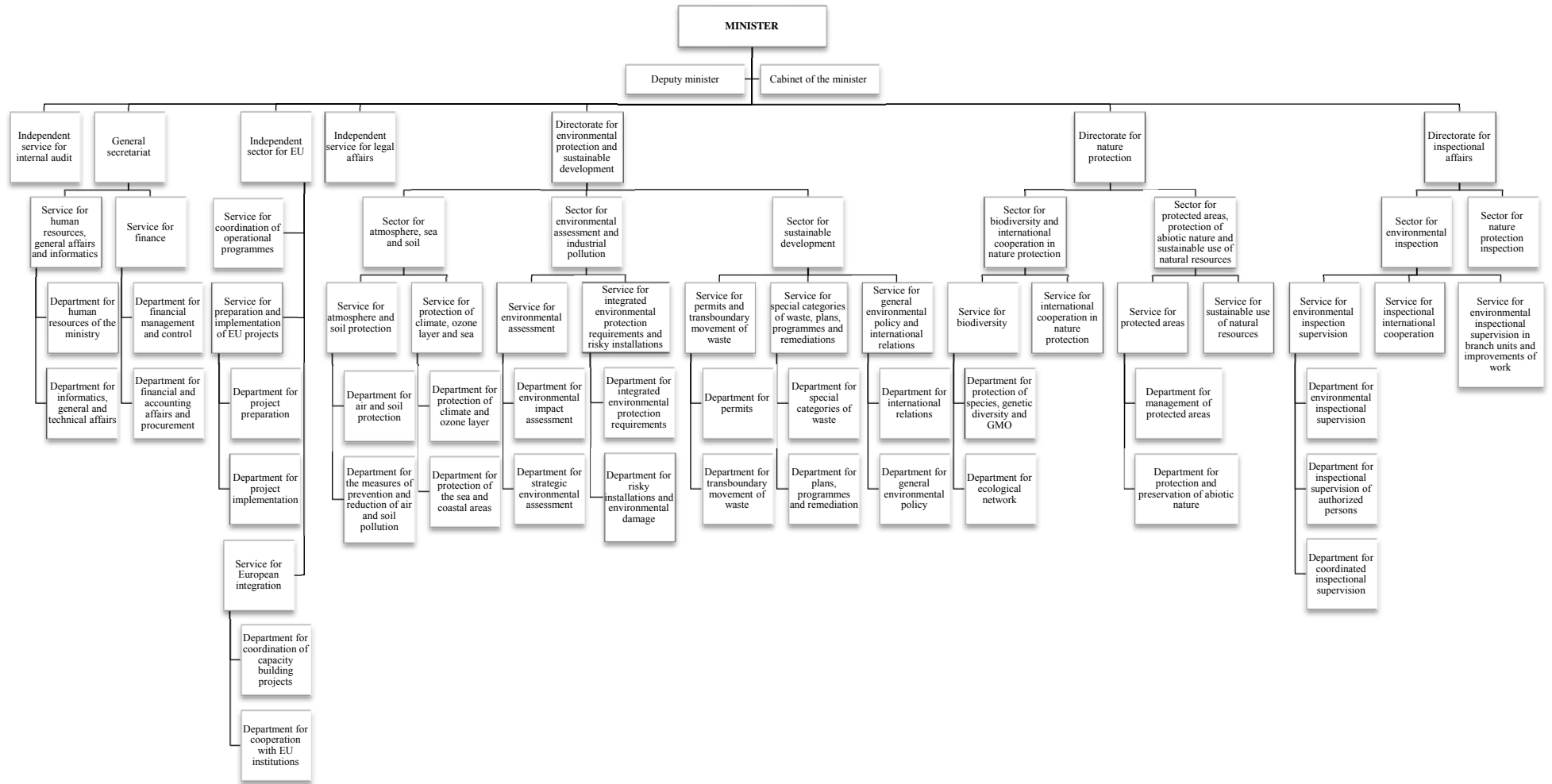
The Ministry of Health is competent for affairs relating to genetically modified organisms (GMO), noise protection, protection from the damaging effects of poison, protection against non-ionizing radiation, and public health. New departments have been created to deal with chemicals and biocides and noise protection.

The Ministry of Maritime Affairs, Transport and Infrastructure is responsible for protection from maritime pollution and protection of inland waters from pollution from ships. The Ministry of Economy is responsible for renewable energies and energy efficiency. The customs department of the Ministry of Finance controls illegal trade of protected species. It also controls transboundary movements of waste and notifies the environmental inspection of suspicious events.

State administrative organizations

Three State administrative organizations representing different areas of State administration have explicit responsibility for environmental protection.

Figure 1.2: Structure of the Ministry of Environmental and Nature Protection



Source: Ministry of Environmental and Nature Protection, 2013.

The Meteorological and Hydrological Service is the focal institution for monitoring climate and air quality. The State Office for Nuclear Safety has competence over radiological and nuclear safety. The National Protection and Rescue Directorate is responsible for the protection of people, assets and the environment in case of disaster or accident and for extending or obtaining help from other countries in emergency situations. Pursuant to the 2011 Act on Public Administration System, all three organizations are headed by a director who is appointed by the Government and is responsible to the Government and competent ministries.

Subordinated institutions

Public institutions, public-right organizations and companies that perform a public service whose major shareholders are the State, counties, towns/cities or municipalities, represent another level of public administration. These organizations include expert and implementation agencies that were largely established pursuant to special acts and as such are independent. In their work they are largely linked either to specific ministries or the Government. For example, CEA, EPEEF and the State Institute for Nature Protection work on programmes under the competence of the Ministry of Environmental and Nature Protection. The work of Croatian Waters is linked to programmes under the responsibility of the Water Management Directorate of the Ministry of Agriculture. The managing committees of these agencies include a representative from the respective ministry.

The CEA established in 2002 by a decision of the Government is an independent public institution that has an obligation to analyze and interpret the environmental data collected and provide the State administration, Government and Parliament with the necessary information to implement environmental policy efficiently. Pursuant to the 2007 EPA, the Agency's scope of work includes developing, managing/operating and coordinating a single Environmental Protection Information System (EPIS). State-of-the-environment reporting is another of the Agency's major tasks. This includes preparation of SoERs for Croatia, activities related to the National List of Indicators, preparation of topical reports on specific environmental components and international reporting activities. The CEA acts as the national focal point for collaboration with the European Environment Agency (EEA) and is included in the European Environment Information and Observation Network (EIONET). Recent years have seen a significant increase in international

projects for CEA capacity building and for strengthening environmental reporting.

EPEEF is an extrabudgetary legal entity that was established in 2003 to ensure additional funds for financing the preparation, development and implementation of projects and programmes in the areas of environmental protection and management of certain types of waste, energy efficiency and use of renewable energy sources. Funds for financing these activities are secured from fees (Chapter 5).

The State Institute for Nature Protection (SINP) is a public institution established by virtue of a 2002 Government regulation that began operating in September 2003. The SINP carries out expert nature protection tasks for Croatia, involving in particular: inventorying; monitoring and assessing the state of nature; developing and coordinating the nature protection information system; preparing expert base proposals for the protection of natural values, managing protected species, establishing conditions for the use of natural resources; providing expert opinions in the appropriate assessment procedure; reporting on the state of nature; participating in the implementation of international agreements on nature protection, including preparing reports to the EU and acting as national expert authority (e.g., regarding implementation of CITES); organizing and implementing educational and promotional activities on nature protection; and preparing and implementing projects supported by international funding. SINP actively cooperates with State administration bodies, agencies, universities, non-governmental organizations, schools and other interest groups.

Other public institutions

Pursuant to the Nature Protection Act, the Government has established 8 public institutions in charge of national parks and 11 in charge of nature parks.

The Institute for Toxicology and Antidoping is a State institution subordinated to the Government that is responsible for: informing about protection against dangerous chemicals; keeping registers on toxic substances in production, imports, exports, usage, marketing and the retail trade; working to prevent chemical accidents, care for accidents and eliminate their consequences; and all other tasks with regard to preventing accidents involving chemicals and mitigating their consequences. As such it *inter alia* serves as a technical body for the implementation of the Chemicals Act.

Croatian Waters is responsible for managing water and public water property, and protective and hydro-ameliorative water structures. It is a public institution that performs water management activities as a public service and is at the third level of public administration. It is run by the Management Board and the General Manager, both appointed by the Government. Croatian Waters provides expert, technical, economic, and legal assistance to municipal users in defining, preparing, and implementing projects of varying complexity.

Decentralization

Since 1999, environment-related responsibilities have increased for local self-governments (428 municipalities and 127 cities) and regional self-governments (20 counties and the City of Zagreb). Up to 2001, environmental protection at county level fell within the scope of offices for physical planning, housing and municipal affairs, construction and environmental protection. From 2001 until 2008, competence for environmental protection lay with State administration offices in counties or their organizational units.

The 2007 Physical Planning and Building Act and the EPA introduced significant changes between national and subnational level with regard to the distribution of competences and the performance of activities on environmental protection. The administration has been decentralized, which includes transferring environmental protection tasks from State administration offices in the counties to organizational units in the counties. By 31 March 2008, all counties and major cities had established organizational units responsible for environmental protection. All employees from State offices working on environmental protection tasks have been allocated to these organizational units.

Organizational units for environmental protection are thus currently responsible for developing physical planning documents and monitoring their implementation in terms of environmental protection; developing environmental reports and programmes; developing environmental protection programmes and environmental protection project proposals; keeping the pollution register; issuing location permits; carrying out EIAs for projects of county and local significance and SEAs for relevant plans and programmes. Their competences also include issuing non-hazardous waste management permits, maintaining the waste cadastre and waste management plans, and establishing nature protection requirements.

Although delegating additional tasks to municipalities and towns was considered as an option during the drafting of the 2007 EPA, it did not occur. Municipalities and major cities thus carry out environmental protection tasks that are of interest to them. In particular, they cooperate with the counties on implementing joint objectives as set out in the strategic county documents. Municipalities and major cities are not however involved in preparing pollution registers, EIAs or SEAs.

Counties' increased responsibilities due to the decentralization process pursuant to the EPA 2007 created a severe need for strengthening administrative capacities at regional level. While the number of staff has increased since 2007, the goal of recruiting a minimum of five employees per county in the county organizational units has largely not been achieved. Capacity-building measures established at subnational level, such as twinning projects and training courses (e.g. SEA courses) are significant but not sufficient to ensure the systematic and coordinated implementation of environmental legislation and policies.

Regional and local self-governments have established 20 public institutions that are responsible for managing protected areas and/or other protected values at regional level and 6 at local level. These public institutions are managed by administrative councils.

Cooperation with major groups

Since 1999, Croatia has experienced an upward trend in terms of institutions, organizations and other legal persons dealing with activities in environmental domains such as measuring, processing of data and information, analysis and training. Legal and natural persons have expressed significant interest in attaining authorization to perform professional environmental protection activities, such as activities related to SEA, EIA and IPPC.

Officially, the number of non-governmental, non-profit associations dealing with environmental protection has been continuously rising since 1999, amounting to 873 non-governmental organizations (NGOs) in April 2013. The number of these NGOs increased by 40 per cent from 2005-2008, and a further 50 per cent from 2008-2013 (table 1.1). However, only a few NGOs play an active role in the policymaking process at national, regional and local level. This has been the case due to, inter alia, a lack of institutional mechanisms for public participation, insufficient funding and inadequate capacities and professionalism in NGOs.

Although public information and participation in environmental matters has improved in legal terms, progress on the ground has been slow. The activity of the majority of NGOs has been largely limited to promotional and awareness-raising activities. Only a few government-organized NGOs, such as Green Action, and some social partners, such as the Croatian Chamber of Economy and the Business Council for Sustainable Development, have been actively involved in interministerial working groups. Their involvement has thus largely taken place on an ad-hoc basis.

Since 1999, social partners have played an increasingly important role in mainstreaming economic and social concerns into environmental and sustainability legislation and policies. For example, the Croatian Chamber of Economy, an independent professional and business organization comprising all legal entities engaged in business, has been actively involved in several ad hoc working groups of the Ministry of Environmental and Nature Protection, such as the APSCP and the LEDS working group. The Croatian Business Council for Sustainable Development is represented on the Economic Council of the President of Croatia. The Croatian Employers Association, a voluntary, non-profitable independent employers' association, is the only employers' representative on the National Economic and Social Council. It influences the creation of economic policy and is also a social partner in the tripartite dialogue with trade unions and Government representatives. Its activities inter alia focus on lobbying with national and local Government institutions and EU institutions for employers' interests in passing and/or amending legislation and regulations on environmental protection.

Horizontal coordination

The horizontal coordination of environmental protection legislation and strategic documents at national level largely takes place in the frame of working groups, commissions and workshops that are responsible for the technical work. They are established by the ministries on an ad-hoc basis for a clearly defined task, such as the Commission for intersectoral coordination of State administration bodies for policies and measures for climate change mitigation and adaptation, and the working group for developing an action plan to implement IPPC obligations.

The composition of these bodies is usually determined by competent ministers. As there is no formal unified practice for involving relevant

stakeholders in the coordinating bodies, there are significant differences in terms of the range and level of stakeholders as well as the extent, time and length of their involvement.

The Government has created several permanent advisory bodies comprising high-level representatives for the purpose of horizontal multi-stakeholder coordination. However, their activity has been weak to non-existent. For example, the Council for Environmental Protection established in 2001 was replaced by the Sustainable Development and Environmental Protection Council in 2009 with a mandate to provide opinions on proposals for documents to be adopted by the Government or Parliament in terms of harmonization in resolving issues related to environmental protection, economic development, climate change and ozone layer protection, and to perform tasks entrusted to it by the Government and the Minister of Environmental and Nature Protection. The first meeting of the Council took place in 2012, when the Minister of Environmental and Nature Protection appointed a new nine-member Council including one representative from the Ministry and members of a range of relevant institutions and civil society organizations. The Council has met four times since its establishment, most recently in June 2013, when the Council gave its comments on the draft new Sustainable Waste Management Act.

The activities of the National Committee for the Development and Implementation of the Strategy for Sustainable Development established in 2003 are virtually non-existent. The main tasks of this permanent body are to create the conditions for including environmental protection issues in sectoral policies and to strengthen interministerial coordination. It consists of high-ranking Government officials from various sectors, including ministers and representatives from all ministries relevant to environmental protection and NGO representatives.

In order to establish a horizontal coordination platform for developing and implementing the Marine Strategy according to Regulation OG 136/11, in 2012 the Government enacted a decision to appoint an Expert National Committee to implement the tasks laid down by the Regulation and to develop and implement the Marine Strategy (OG 117/12). The Expert National Committee includes appointed representatives from scientific and expert institutions as well as representatives of the Ministry of Environmental and Nature Protection and other competent bodies identified under the Regulation.

Table 1.1: Environmental NGOs

NGOs	2005	2008	April 2013
Nature protection	278	363	475
Other areas of environmental protection	140	220	398
Total	418	583	873

Source: Ministry of Public Administration, 2013.

The idea of linking the Marine Strategy with the ICZM Strategy in one single document (Coastal and Marine Management Strategy), as reflected in the new 2013 EPA, led to the enlargement of the Expert National Committee with the members of the ICZM Coordination group established in 2009. Representatives of coastal counties are also invited in a stakeholder capacity to actively participate in the Committee's work in the form of a working group, since the coastal counties form the area in which the future Strategy will be implemented. The Extended National Committee is thus expected to present an institutional coordination platform to draw up and implement the Coastal and Marine Management Strategy, and contribute to the overall improvement of existing coordination mechanisms for marine environment and coastal area protection and management on national and regional level. To date, in 2011 the National Committee has adopted the first Marine Strategy document, i.e. Initial assessment of the state and pressure on the marine environment in the Croatian part of the Adriatic Sea.

The Environmental and Nature Protection Forum established by the Minister of Environmental and Nature Protection in 2012 has to date remained inactive. It was established to provide suggestions and opinions on policy guidelines related to environmental and nature protection prior to the adoption of regulations, and to make strategic decisions in the respective areas. The Forum comprises 12 members including representatives from economic sectors, local and regional self-governments, professional institutions and NGOs.

The sectoral ministries have largely failed to establish units for environmental protection or determine coordinators responsible for environmental protection and sustainable development to collaborate with the Ministry of Environmental and Nature Protection as anticipated in the 2002 NEPP. However, horizontal coordination is established in practice through a number of ad hoc working groups appointed for different environmental themes on a regular basis. Members of the working groups are appointed from relevant governmental bodies, business and civil sectors, institutes and agencies.

At county level, horizontal coordination of policies typically involves weekly interdepartmental meetings between the organizational environment protection units and other county units. There are no institutional mechanisms in place to ensure coordinated elaboration and implementation of EPPs between counties and major cities. Cooperation between counties and major cities largely takes place on an ad hoc basis at the level of heads of environmental protection organizational units.

The Croatian Association of Counties was established in 2001 to strengthen cooperation between counties. However, the Association, now encompassing all counties except the City of Zagreb, has not played an active role in terms of horizontal coordination of EPP development and implementation, and it has not been present at workshops and commissions created at national level to develop strategic documents. The Association of Towns, now including 102 members, was created in 2002 to improve cooperation at local level and promote the common interests of towns. However, its role in developing and implementing environment protection has also been minimal.

Vertical coordination

The level and intensity of the involvement of counties, major cities and municipalities in developing and implementing legislative and strategic documents at national level differs depending on the area of environmental protection. In some cases, single counties and major cities were invited to take part in the working groups created by ministries to develop strategic and legislative documents. However, too often counties only have the opportunity to express their views on environmental legislation and policies within public consultations. Consequently, counties are often confronted with legal obligations on environmental protection that were developed without their involvement or input. The City of Zagreb and Zagreb County, for example, were invited by the Ministry of Environmental and Nature Protection to take part in the working group to amend the Waste Act in 2011. However, they were not invited to any meetings and thus had no influence on the finalization of the Waste

Act, despite the fact that it includes a range of obligations for the counties.

Counties, municipalities and towns can adopt their EPPs only upon prior approval by the Ministry of Environmental and Nature Protection, which checks that EPPs conform with the NEPP. However, the Ministry of Environmental and Nature Protection is not actively involved in drawing up and implementing EPPs. In addition, coordination of environmental and sustainability policies between counties and municipalities/towns largely takes place on an ad hoc basis.

1.6 Conclusions and Recommendations

Croatia has significantly strengthened its environmental legislation and policy framework for environmental protection and sustainable development since 1999. This has particularly been the case for air quality, nature protection, climate change, water management and waste management. Public participation and information on environmental matters have significantly improved in legal terms.

However, the environmental legislative and policy framework is highly fragmented and insufficiently consistent with sectoral legislation and policies. The mainstreaming of environmental concerns into sectoral legislation and policies has been largely conceptual, with no such integration in terms of implementation. The implementation gap continues to represent a major challenge. This is inter alia linked to three factors: i) insufficient formal institutional mechanisms for horizontal and vertical regulatory and policy coordination, in particular at high administrative and governmental level, combined with high fragmentation of responsibilities for environmental protection and sustainable development, ii) insufficient allocations from the State budget and investments in areas such as waste and water management, air quality, Adriatic and biodiversity protection and iii) insufficient administrative capacity, in particular at regional and local levels due to the decentralization of public administration and growing EU requirements.

Recommendation 1.1

The Government should strengthen institutional mechanisms for horizontal and vertical coordination of legislation and policies on environmental protection and sustainable development, in particular by:

(a) *Activating the existing coordination bodies, such as the Environmental Protection and*

Sustainable Development Council, the National Committee for the Development and Implementation of the Strategy for Sustainable Development and the Environmental and Nature Protection Forum;

(b) *Designating the Ministry of Environmental and Nature Protection as the coordinating body on environmental issues among the relevant sectoral ministries;*

Recommendation 1.2

The Ministry of Environmental and Nature Protection should designate a unit responsible for facilitating coordination and cooperation with and among the country's counties in developing and implementing subnational environmental legislation and policies, such as the environmental protection plans.

Recommendation 1.3

The Government should strengthen the environmental protection and sustainable development capacities of public institutions at the national, regional and local levels, in particular by:

(a) *Fulfilling the obligation to increase to an adequate level the number of employees in the Ministry of Environmental and Nature Protection to cover the increased responsibility of the Ministry;*

(b) *Continuing to strengthen the environmental training programme for civil servants, including the development of supporting tools, such as guidelines and handbooks, to ensure the systematic and high-quality fulfilment of the enhanced responsibilities of various public authorities for environmental protection.*

Although Croatia established a legal framework for exercising SEA in 2008, its implementation on the ground has been poor inter alia due to the weak role of the Ministry of Environmental and Nature Protection in the whole SEA procedure, in particular at regional level, the weak methodological framework of the SEA, insufficient capacity building measures for SEA, and the narrow scope of the SEA.

Recommendation 1.4

Based on the 2013 Act on Environmental Protection, the Government should promote strategic environmental assessment (SEA) implementation by:

(a) *Extending the scope of SEA to all strategic documents;*

(b) *Increasing the role of the Ministry of Environmental and Nature Protection by making its approval of the whole SEA procedure and its membership in the regional SEA committees mandatory.*

Recommendation 1.5

The Ministry of Environmental and Nature Protection, in cooperation with other competent authorities, should establish a quality assurance mechanism ensuring the effective implementation of SEA obligations at national and local levels and the provision of support for those carrying out SEAs.

Although the private and public sectors in Croatia are increasingly committed to promoting a green economy, Croatia lacks a formal strategic policy framework that establishes strong governance mechanisms for intersectoral, multi-stakeholder, multilevel coordination of green initiatives and ensures a strong public-private partnership with a common agenda on the green economy.

Recommendation 1.6

The Government should strengthen its development policy, investments and expenditures towards green economy by developing, coordinating and monitoring the implementation of a strategic action plan for green economy that:

- (a) Formalizes responsibilities for promoting green economy;*
- (b) Establishes institutional mechanisms at the political and technical levels for intersectoral coordination of green initiatives;*
- (c) Sets priorities and measures for the systematic and integrated use of European Union (EU) structural funds, national funds and earmarked financial sources, and for triggering domestic and foreign private investment;*
- (d) Sets deadlines, timelines and concrete goals for implementation and monitoring mechanisms.*

Chapter 2

COMPLIANCE AND ENFORCEMENT MECHANISMS

2.1 Main developments since 1999

There have been many positive developments in Croatia since 1999. Permissions and environmental impact assessment (EIA) procedures have been amended to make them more transparent, coordination of inspection activities has been improved, risk-based planning approaches have been adopted, and the deterrent aspect of criminal enforcement has been increased. At the same time, the compliance assurance system is very much skewed towards punitive approaches, with compliance promotion taking place at an early stage. Judicial enforcement, which is used in Croatia more extensively than in other countries, is often slow and thus insufficiently effective. Fines (a preponderant non-compliance response instrument) are high but do not have adequate economic underpinning. Compliance assurance strategies for small- and medium-sized enterprises are not yet adequately aligned to the country's regulatory regime, which widely employs general binding rules to reduce the administrative burden on the regulated community. Compliance with EU legislation will require additional capacity development among regulators and the regulated community alike.

Croatia entered the European Union at a time when the focus on implementation was making headway. At the same time, the costs of environmental compliance increasingly come under the spotlight because of the economic challenges faced by the business sector. Due to this combination of circumstances, the compliance assurance strategies that public authorities put in place must undergo a feasibility test and be based on a full understanding and acceptance of regulatory goals and needs by the regulated community.

2.2 Institutional framework for compliance assurance

Croatia has a tradition of centralized governance on environmental regulation and compliance assurance, with regional self-governing units (counties) only playing a role in EIA and non-hazardous waste permits. Institutional arrangements for environmental compliance assurance are shared between the Ministry of Environmental and Nature Protection, the Ministry of Agriculture, the Sanitary Inspection of

the Ministry of Health, the Ministry of the Interior, the Ministry of Maritime Affairs, Transport and Infrastructure, the State Inspectorate, the Croatian Environment Agency (CEA), and the National Protection and Rescue Directorate. Most central-level agencies have sub-units at local level.

Ministry of Environmental and Nature Protection

The Ministry of Environmental and Nature Protection's mandate covers industrial pollution, air quality, waste, light pollution, protection and management of sea and coastal areas, including sea bathing and water quality, and nature protection. It deals with strategic and project-level environmental assessments, integrated and hazardous waste permitting, inspection, and administrative compliance assurance. The Ministry is the competent authority for EIAs and permitting for large industrial plants, and coordinates with authorities responsible for other types of permits. These functions within the Ministry are performed by the Sector for Environmental Assessment and Industrial Pollution, which is part of the Directorate for Environmental Protection and Sustainable Development.

Environmental inspection and administrative enforcement functions are delegated to the Ministry of Environmental and Nature Protection's Directorate for Inspection Affairs (DIA), which covers two sectors: (i) the sector for environmental inspection (SEI) and (ii) the sector for nature protection inspection (SNPI). The SEI inspects legal and natural persons regarding implementation of the Environment Protection Act (EPA), the Air Protection Act, the Act on Protection against Light Pollution, the Waste Act and related secondary legislation. Among other things, the scope of the SEI's work includes issues related to the quality of bathing water at beaches, the transboundary movement of waste and hazardous waste, petroleum-derived liquid fuels, the handling of substances that deplete the ozone layer, and the implementation of ratified international agreements. The SNPI inspects protected areas and supervises the implementation of protection of strictly protected and protected animal and plant species and use of natural assets. Additionally, in cooperation with other competent services, the SNPI performs inspections related to

transboundary trade of protected and other wild species for which a permit is required. Together with the Sanitary Inspection and Agricultural Inspection, SNPI performs inspections under the Act on Genetically Modified Organisms (GMO).

The DIA has a coordinating role on compliance assurance in the environmental sector and cooperates with other relevant inspectorates and Government bodies in planning and managing control activities, emergency situations, and data exchange. The cooperation and horizontal coordinating role of DIA in supervising all environment components is laid down in the Agreement on Cooperation between Inspection Services in the Field of Environment, signed on 2007 and regularly updated since. It was further confirmed by the Agreement on Cooperation between the Ministry of Environmental and Nature Protection and the National Protection and Rescue Directorate signed in January 2013; an earlier agreement with the Ministry of Defence exists on joint thematic control activities at military sites. The DIA also acts in response to applications and complaints from citizens and at the request of other competent bodies.

During the period 2004-2012, which coincided with the active development of environmental legislation and institutions, the field of nature protection (including nature protection inspection) came under the Ministry of Culture. The result was reduced access to capacity building offered as part of the EU accession process, inadequate equipment levels, and uncoordinated development of data management systems. This institutional separation also had repercussions in terms of access to international networking and information flows. Since 2012, nature protection has been integrated into the national environmental authority.

The DIA's facilities and equipment are relatively modern and it has a sufficient operational budget. Staff turnover is relatively low. Staff numbers at the DIA have increased in recent years and the last decade has seen continuous recruitment of new environmental inspectors. Between 2000 and 2012 the number of environmental inspectors steadily increased from 28 to 79. In 2012, 16 nature protection inspectors joined the DIA. The SEI has offices in practically every administrative unit in the country, grouped into 5 branch units following a regional pattern. In February 2013, 56 inspectors were based in branch units, while 23 inspectors worked in the central office in Zagreb. The system is centralized; all inspectors have civil servant status and are involved in activities of a similar scale. The SNPI has a limited number of staff split between the

central office in Zagreb (7) and external offices (9). When inspecting protected areas, nature protection inspectors can get support from 160 supervisors and rangers working in protected nature areas, bearing in mind that inspectors' jurisdiction covers the entire country, while rangers can only exert power within their protected areas. Financial resources for environmental inspection work are allocated from the State budget.

Ministry of Agriculture

Water and forest management have traditionally been handled independently from the environment. The Ministry of Agriculture is responsible for policy development and compliance assurance in both areas, while management functions are delegated to the State-owned companies, Croatian Waters and Croatian Forests, which are subordinate to the Ministry. In both areas, the division between policy, economic use and compliance assurance functions is not very clear.

The State Management Directorate at the Ministry is responsible for issues related to integrated management of water resources. Its Sector for State Water Inspection, Administrative Supervision and Appeals Procedure is responsible for supervising the implementation of the requirements established by the 2009 Water Act (OG 153/09, OG 130/11, 130/11 and 56/13) and the 2009 Act on Water Management Financing (OG 153/09, 90/11, included in new Water Act 56/13), as well as complementary regulations and planning documents, including controlling the payment of water fees and water concession fees. It also participates in coordinated inspection supervisions with other related inspections.

Water inspection is carried out by 36 civil servants. The 700-strong water agency Croatian Waters is responsible, inter alia, for issuing water permits and monitoring water quality, while implementation of the requirements established through water permits is checked by the above-mentioned Sector. At the same time, Croatian Waters has the prerogative to supervise the implementation of conditions relating to water rights documents ("water supervision").

The Directorate for Forestry, Hunting and Wood Industry includes the Sector of Forest and Hunting Inspection, which supervises the implementation of forest legislation, notably the Forest Act (OG 140/05, 82/06, 129/08, 80/10, 124/10, 25/12 and 68/12). This function is carried out by 28 forest inspectors. To combat the illegal transport of wood, they work closely with the police: only road police can stop cars, while forest inspectors have a mandate to take

legal action when illegal wood transport is discovered. The Croatian Forests agency is primarily responsible for managing State forests and forest land, although since 2011 it can also manage private forests. It has an obligation to ensure the protection of State forests against illegal appropriation or use. Rangers employed by the agency have the right to ask people to produce identification, to search them, their luggage and means of transport, and remove any illegally appropriated forest products and the means by which the illegal appropriation was performed. They cooperate with forest inspectors on resolving large-scale cases of illegal poaching.

Regional and local self-governments

Local and regional self-governments do not exercise controls because environmental protection inspection is only organized at central level. The regional administration issues permits for non-hazardous industrial waste management, while municipal waste comes under the jurisdiction of local Government (municipalities and towns). Regional self-governments must establish a register of pollution emissions into the air, water and soil, and waste generation and transfer. In terms of regulation, local self-governments may determine stricter tolerance values for air quality than those stipulated at national level. In practice, municipalities can order the application of special measures if alert thresholds are reached.

The regional self-Government administration is the competent body in the EIA procedure; the municipalities are consulted (and are influential in the final decision) but do not have statutory powers. They organize the public debate/hearing on EIA. Local and regional self-Government authorities can establish public institutions to manage protected areas at their level. Currently, there are 20 public institutions for managing protected areas at regional self-Government level, and 6 at local self-Government level.

Cooperation between SEIs and the local and regional self-Government bodies competent for environmental protection is mostly centred on preparing documents containing measures for air pollution prevention, waste management, and obligations to submit environmental data (counties check/validate PRTR data in cooperation with inspectors).

Investigation and enforcement authorities

The police play an important role in detecting offences against the environment, both through their presence on the field, and as the body to which

citizens most often report a violation of regulations, including environmental offences. They inform line ministries, which can then proceed with appropriate steps under the applicable legislation, including misdemeanour provisions. Furthermore they can provide assistance to inspectors who come up against resistance to their activities and measures. In each county police department, at least one police officer has participated in a training programme on crimes against the environment developed during implementation of the IPA 2008 twinning project “Enforcement of the new Environmental Protection Act harmonized with EU legislation in cases of criminal offences against the environment” in SEI.

Water inspectors report an increase in the number of criminal prosecution cases, often discovered/initiated by the police (e.g. restricted fishing). Joint action with the criminal police is also on the rise, e.g. on gravel extraction cases.

2.3 Legal framework

EIA matters are regulated by the 2007 Environmental Protection Act (OG 110/07), the 2008 Regulation on environmental impact assessment (OG 64/08) and the 2008 Regulation on information and participation of the public and public concerned in environmental protection issues (OG 64/08). The 2008 EIA Regulation includes criteria on the EIA’s scope, with a list of projects for which EIA is mandatory (Annex I), a list of projects subject to an evaluation of the need for an EIA under the competence of the Ministry of Environmental and Nature Protection (Annex II), and a list of projects subject to an evaluation of the need for an EIA under the competence of the administrative body in the county or the City of Zagreb (Annex III).

The 2007 Environmental Protection Act (OG 110/07), the 2008 EIA Regulation (OG 64/08) and the 2008 Regulation on the procedure for establishing integrated environmental protection requirements (OG 114/08) transpose the IPPC Directive 2008/1/EC. This legislation determines the integrated environmental protection requirements for new installations, reconstructions of existing installations, and existing installations that fall under activities set out in Annex I of the Regulation on the procedure for establishing integrated environmental protection requirements.

Environmental inspection in Croatia is mainly regulated by:

- General Administrative Procedures Act (OG 47/09);

Photo 2.1: Monument to Ban Jelacic, Zagreb

- Environmental Protection Act (OG 80/113);
- Air Protection Act (130/11) and Act on Sustainable Waste Management (OG 94/13);
- Ordinance on Responsibilities of the Inspectorate of the former Ministry of Environmental Protection, Physical Planning and Construction (OG 12/09);

The General Administrative Procedures Act describes inspection procedures, for example the obligation of inspectors to prepare inspection reports, which have to be signed by the inspected entity. Articles 180-214 of the Environmental Protection Act deal with a broad range of compliance assurance powers, enacting the use of coordinated site visits and enabling partners from other ministries to access sites and take action following coordinated inspections. The Act on Sustainable Waste Management (Articles 141-166) and the Air Protection Act (Articles 125-144) also provide guidance on inspection criteria and procedures.

Many of the key elements of the *acquis* (such as water and waste management and industrial regulation) were reflected in Croatian law well before the accession process started. Despite this, Croatian industry will need significant investments to comply with the EU environmental *acquis*. For instance, many of the 35 large combustion plants (LCPs) in operation do not comply with the emission limit values (ELVs) prescribed by the LCP directive. Only

one LCP, Plomin II, constructed in 1999, uses modern technology to minimize air emissions and meets the prescribed ELVs. Of the 35 LCPs, eleven have been given an extension to 1 January 2018 to reduce their emissions. The estimated cost of complying with the LCP directive is €2 billion. To comply with the IPPC Directive, transitional periods were granted to 67 installations until 1 January 2018. A selected list of sites must reduce their emissions of volatile organic compounds by 1 January 2016, with several intermediate deadlines. In order to facilitate the financial costs of reaching compliance with the IPPC requirements, an agreement has been reached with the Ministry of Economy and the Croatian Bank for Reconstruction and Development, facilitating favourable loans to IPPC installations for that purpose.

Ambient quality standards

Ambient environmental quality standards for air, surface water, groundwater and seawater, together with related monitoring provisions, have been established in a range of regulations. Most have been adopted or revised in the context of harmonization with the EU regulatory framework.

On air quality, the Regulation on levels of pollutants in ambient air (OG 117/12) and the Ordinance on monitoring air quality (OG 3/13) were prepared in the wake of the 2011 Air Protection Act, which

incorporated the provisions of the new *acquis* on ambient air quality and cleaner air for Europe. Measures are being taken to gradually reduce pollution in line with threshold values for certain pollutants set by the *acquis*. The air in Croatia is mostly clean or slightly polluted, although in some urban areas the air is moderately or excessively polluted. Measures implemented have contributed to a significant improvement in air quality, for example, in the towns of Sisak and Rijeka.

The Regulation of water quality standards (OG 73/13) prescribes standards for surface water, coastal waters, territorial seawaters and groundwater and transposes the Directive on environmental quality standards on water policy 2008/105/EC. Other important implementation acts related to ambient water quality objectives are: the Decision on designation of sensitive areas (OG 81/10), the Decision on the designation of vulnerable areas (OG 130/12), the Decision on designating waters which support freshwater fish life (OG 33/11) and the Decision on designating waters which support shellfish life and growth (OG 78/11).

Inland waters are classified into one of five quality classes depending on the permitted indicator values, according to the 2008 Regulation on Water Classification (OG 137/08). The quality of rivers and lakes remains acceptable in most locations, with a decreasing trend in organic pollution thanks to new sewerage systems and urban wastewater treatment plants.

Croatia started implementing the Bathing Water Directive 2006/7/EC from the date of accession. Bathing water quality is monitored in line with the Regulation on coastal bathing water quality (OG 73/08) and the Regulation on bathing water quality (OG 51/10). Responsibilities for water and marine environment management are shared: the Ministry of Environmental and Nature Protection is responsible for implementing the Regulation on coastal bathing water quality (OG 73/08), and the Ministry of Agriculture implements the Regulation on bathing water quality (OG 51/10). During the 2012 bathing season, 96 per cent of coastal bathing waters in Croatia (out of 912 monitored sites) were of excellent quality, making it one of the five leading countries in the EU. Respecting the transposed obligations from the Marine Strategy Framework Directive 2008/56/EC, Croatia has adopted the obligation to develop additional criteria and standards related to the marine environment in the framework of its Marine and Coastal Management Strategy documents.

Emission standards

Protecting the environment efficiently requires the application of ambient (air and water) quality standards as well as emission/effluent limit values, in a so-called “combined approach”. A project’s impact on the water status is determined by combining an assessment of the impact of the project with the status of water bodies that come under its impact, by applying water and effluent quality standards. If the status of a water body receiving wastewater requires more stringent restrictions of emissions, then such restrictions must be applied.

The 2012 Regulation on limit values for pollutant emissions from stationary sources into the air (OG 117/12) and the previous 2007 Regulation (OG 21/07) defined specific environmental norms for different sectors. These sectoral standards have been aligned with the relevant EC Directives and Multilateral Environmental Agreements to which Croatia is a party.

The 2012 Regulation was further aligned with the new Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control). It introduced stricter general ELVs for powdery substances to reflect the new EU and/or international requirements for particulate matter in the ambient air, as well as new ELVs for new and existing combustion plants and gas turbines, internal combustion engines, and waste incineration and waste co-incineration plants.

The Ordinance on emission limit values of wastewater discharges (OG 87/13) sets specific limit values for wastewater discharges from the industrial sector.

Product standards

National specifications regarding marketable conventional and alternative fuel products are in line with the EU. The Regulation on the quality of petroleum-derived liquid fuels (OG 113/13) transposed the Fuel Quality Directive 98/70/EC relating to petrol and diesel fuels as well as the Sulphur in Fuels Directive 1999/32/EC relating to heavy fuel oil and gas oil quality. Since 2006, only lead-free petrol has been marketed in Croatia. According to the amendments to the Regulation, since 1 January 2012, petrol of Euro 5 standard has been marketed in Croatia.

The 2013 Regulation on the quality of petroleum-derived liquid fuels (OG 113/13) transposed the new elements of the petrol, diesel and gas oil

specifications from Directive 2009/30/EC amending Directive 98/70/EC, bringing the maximum allowable sulphur content of both petrol and diesel to 10 ppm according to EU standards. The Regulation on the quality of petroleum-derived liquid fuels prescribing the quality of fuel oil and marine fuel has been conform to EU standards since 1 January 2013.

The 2011 Regulation on the quality of biofuels (OG 33/11) lays down the limit values for the quality of biofuels on the domestic market. Annual programmes monitor the quality of liquid oil fuels.

The 2013 Regulation on limit values for volatile organic compound content in certain paints and varnishes used in construction and vehicle finishing products (OG 69/13) transposed the EU *acquis* in this field. Croatia has also implemented legislation on technical standards to reduce emissions of VOCs from petrol stations, notably the 2006 Regulation on technical standards of environmental protection from volatile organic compound emissions by storage of petrol and its distribution (OG 135/06) and the 2011 Regulation on environmental technical standards for reduction of volatile organic compounds emissions during refuelling of motor vehicles at petrol stations (OG 5/11).

In the field of construction, the 2010 Physical Planning and Construction Act made energy performance certification mandatory for new buildings. Croatia has harmonized its Technical requirements for thermal energy saving and thermal insulation in buildings (OG 74/06) and Technical requirements for rational use of energy and thermal insulation in buildings (OG 89/09) with the respective EU construction product requirements.

Energy efficiency standards for household electrical appliances are implemented through different regulations, e.g. Ordinance on energy efficiency requirements for household electric refrigerators, freezers and combined appliances, and the 2007 Ordinance on energy efficiency labelling of household appliances (OG 130/07).

2.4 Regulated community

Identification of the regulated community in Croatia is based on the requirement that all natural and legal persons engaged in a business activity located on Croatian territory must become a member of the Croatian Chamber of Economy (CEE) as an entry in the court register. Currently, 93,063 entities are registered at the CEE. Their classification follows the National Classification of Economic Activities (NCEA). The main NCEA groups relevant to

environmental protection include: agriculture, forestry and fishing (1,610 entities), mining and quarrying (245 entities), manufacturing / industrial installations (11,049 entities), energy production (216 entities), water supply, wastewater (about 160 water utility companies owned by local or regional self-governments are responsible for public water supply and wastewater systems including wastewater treatments), waste management (562 entities), construction (12,565 entities), handicrafts (27,848 entities), transport and storage (3,299 entities), tourism (4,914 entities), and health and social activities (805 entities).

Besides the CEE registry, more specialized sources of information on the regulated community exist, the most central of which is the Emission Pollution Register (i.e. the national Pollutant Release and Transfer Register). Entities that generate more than 50 kg of hazardous waste or 2,000 kg of non-hazardous waste per year have to submit data to include in this register, and some 3,000 entities do so regularly. The register is maintained by the Croatian Environmental Agency, which shares the information with the Directorate for Inspection Affairs. The Ministry of Environmental and Nature Protection handles IPPC permits, and so data on large-scale industry is mostly dealt with by inspectors from the Ministry. Other sources of information on the regulated community include databases on major sources of volatile organic compounds and sources handling ozone-depleting substances. Thematic inspection campaigns are used to identify and profile installations performing similar activities that are not regulated by IPPCs and EIAs.

A relatively limited number of large installations are located in Croatia. However, information on such installations is imprecise since lists are not publicly available. The number of IPPC installations is not officially published and different sources present different data – generally between 200 and 270 installations. This gives the impression that identifying IPPC installations is still a challenge. Some middle-size companies have difficulty ascertaining whether they are subject to IPPC requirements. Some companies argue that they should be excluded because of decreased production capacity, but the relevant procedure is long. Most IPPC installations require transitional periods for compliance. Large poultry and pig farms constitute more than one quarter of all IPPC installations. There are 45 SEVESO installations in total, including 11 upper tier and 34 lower tier. Thirty-five large combustion plants exist. Finally, there are 146 active landfills in Croatia, most of which are to be regulated

under the IPPC Directive. Waste is also handled at one incineration plant and 22 co-incineration plants.

2.5 Environmental assessment tools and permitting

Environmental impact assessment

EIAs have been mandatory since 1984 for individual projects that may have significant effects on the environment because of their nature, size or location. The EIA procedure is applied systematically, including in a transboundary context. It proceeds in several phases that include consultations with relevant authorities and the general public. The public can be involved in the screening and scoping phases, and a public hearing of each EIA report is mandatory. The public consultation element of the EIA procedure has been strengthened since 1999.

The transposition of the relevant EU legislation has resulted in further developments in the EIA procedure and enlarged the scope of assessments. The EIA Directive was transposed in the 2007 Environment Protection Act.

The EIA procedure is implemented at an early stage of project planning or, at the latest, prior to issuing the location permit or other approvals for project implementation. EIAs result in a formal decision by the competent authority, i.e. the Ministry of Environmental and Nature Protection, on the environmental acceptability of the project. This administrative document must contain the environmental protection measures and the environmental monitoring programme established during the EIA procedure. At a later stage, these requirements become an integral part of the project implementation permits (e.g. location and building permit) and are integrated into the project's technical documentation.

EIA legislation normally calls for an analysis of alternatives, but in the Croatian legal system such "alternatives" mostly consist in examining various technologies for the proposed activity rather than locating alternatives. As a result, no clear EIA requirements exist for locating waste management facilities. More generally, it is common practice to carry out an EIA only *after* the site is selected (the EIA document is used to report retroactively on sites to justify their selection).

The EIA's screening phase, introduced in 2008, aims to define whether an environmental impact study (EIS) is necessary. This decision is made based on information supplied by the project's sponsor. Some

60 projects went through the screening phase in 2010 and almost 90 projects in 2011. The EIA Regulation prescribes the mandatory content of the EIS, and its Annex IV fully aligns it to the EIA Directive 85/337/EEC. An EIS can only be prepared by a legal person authorized by the Ministry of Environmental and Nature Protection. An Advisory Committee, composed of 10 members representing central Government authorities, academic circles, and local and regional self-governance authorities, reviews the EIS content and provides recommendations to the competent authority. Committee members can also propose possible alternatives, environmental protection measures and an environmental monitoring programme for the project. In the event that a large number of projects of the same type are planned, a standing expert committee is appointed (e.g. for roads). The Ministry's decision on an EIS also takes account of the opinion of the competent body on nature protection issues and the outcomes of public consultations. So far, public opposition has led to changes in some projects, but never cancellation.

A positive decision on an EIS launches the location permit procedure, which is delivered by the Ministry of Construction and Physical Planning or county/municipal authorities. There is no right to administrative appeal against an EIA decision; any disputes must be resolved in administrative courts.

The number of EIA cases was on a steady rise for a decade until the economic downturn of 2008 (table 2.1). Most EIAs have been related to infrastructure projects (roads, wastewater treatment plants), waste landfills, exploitation of mineral resources, wind farms and installations for intensive poultry rearing. During the period analyzed, the share of negative EIA decisions pronounced by the competent bodies oscillated around 15 per cent, with a maximum of 24 per cent of negative decisions in 2005 (table 2.1), illustrating that authorities can be critical in their examination of applications.

When a proposed activity is likely to cause transboundary impact, the assessment carried out pursuant to national legislation is supplemented by an assessment under the Espoo Convention (chapter 4). Improved information flows and capacity development activities have contributed to progress in EIA outcomes over the last decade. Currently, local and regional self-Government authorities are fully informed of and closely involved in the EIA procedure. Technical guidelines on EIS development and training of authorized experts have improved the standardization and quality of environmental impact studies.

Table 2.1: EIA procedures carried out in Croatia in the period 2000-2011

Year	Number of EIA procedures	Number of negative decisions (rejected)	Share of negative decisions (%)
2000	57	5	9
2001	72	7	10
2002	115	14	12
2003	146	19	13
2004	107	22	21
2005	138	33	24
2006	173	21	12
2007	184	30	16
2008	127	12	9
2009	97	13	13
2010	79	7	9
2011	70	8	11
Total	1,365	191	14

Source: Ministry of Environmental and Nature Protection, 2013.

Likewise, the training of representatives from bodies competent to protect individual environmental components and burdens have contributed to more efficient functioning of the advisory expert committee and thus to the quality of the EIA procedure itself.

Appropriate assessment

The 2008 amendment of the Nature Protection Act took into consideration the need for an “appropriate assessment” stipulated in the Habitats Directive and required it for projects that may have significant effects on the national ecological network, and protected areas more specifically. According to the Nature Protection Act, this procedure has three phases: Screening, Main Assessment and the Procedure of Establishing the Overriding Public Interest and Compensation Measures. If an EIA is not necessary but appropriate assessment is needed (this may be the case, for example, for small scale sand extraction) it will be resolved by the Nature Protection Directorate of the Ministry of Environmental and Nature Protection. Local authorities are responsible for appropriate assessment in significant cases for the county. The Procedure of Establishing the Overriding Public Interest and Compensation Measures is in all cases under the competence of the Ministry of Environmental and Nature Protection.

The new Nature Protection Act (OG 80/13) entered into force in July 2013. In November 2013, the Croatian Government adopted the new Regulation on Ecological Network (OG 124/13) establishing the Natura 2000 ecological network. The 2013 NPA improved the Appropriate Assessment of projects by

defining a clear division of competences among authorities, as well as clear deadlines and conditions under which the Screening phase, Main Assessment phase and Procedure of establishing the Overriding Public Interest and Compensation Measures have to be carried out. All phases of the Appropriate Assessment are now defined as administrative procedures, ending with the administrative act in case of disagreement by the proponent subject to appeal or administrative dispute. Each phase of the Appropriate Assessment requires the opinion of the State Institute for Nature Protection, which is the central expert institution for nature protection in Croatia. The general public are also informed about the process, with the publication of the results (final administrative acts allowing the project or rejecting the application) on the Internet page of the Ministry or relevant county administrative office.

Integrated permitting of large industrial installations

In Croatia, regulations have not traditionally included stand-alone environmental permits. The country has a system of location, construction and use permits, issued by local and regional self-governments or the Ministry of Construction and Physical Planning, including requirements established by environmental authorities. For large industrial installations, an integrated approach of establishing such requirements was introduced following the transposition of the IPPC Directive. For new installations, the IPPC permissions procedure has been integrated with EIAs. The law decrees that the overall procedure, which should include public information and public participation, must be completed within six months. The key steps of the

IPPC permissions process in Croatia are the following:

- Development of an application and its submission to the competent authority;
- Preliminary assessment of application by the competent authority (IPPC Unit of the MENP);
- Circulation of the application among the “statutory consultees” (nature protection, air protection and waste management departments of the MENP, Croatian Waters / Ministry of Agriculture, Ministry of Health);
- Incorporation of inputs from statutory consultees into the application;
- Review of statements and application assessment by the IPPC Unit on the MENP;
- Publication of the application;
- Public hearing/debate in presence of county and municipal authorities and NGOs;
- Preparation of a draft decision on environmental conditions to be followed by the installation and its publication;
- Issue of final decision on IPPC permit.

Authorized Consultancy Organizations (ACOs) are normally hired by the project developer to draft the IPPC application.

Existing installations had to complete the IPPC application process in 2011. As a first step, the operators of existing installations had to develop a status analysis of the installation and a compliance study. These documents had to be sent to the Ministry of Environmental and Nature Protection for assessment within three years from the date of entry into force of the Environmental Protection Act (October 2007). After obtaining a positive opinion on the status analysis and compliance study, companies had six months to submit a request to determine the IPPC requirements for the respective installation. There were considerable delays in achieving this objective.

In its capacity as competent authority and coordinating body for IPPC procedure, the Ministry of Environmental and Nature Protection has a mandate to issue a decision on integrated environmental protection requirements (i.e. a document that is analogous to an IPPC permit). Several line ministries participate in the process of preparing this decision. From a practical point of view this means that, for instance, the Ministry of Agriculture / Croatian Waters establishes conditions related to water (use and emissions), the Ministry of Health deals with noise regulation, and so on. The Ministry of Environmental and Nature Protection

then integrates these conditions into the above-mentioned decision. Expertise in determining IPPC permit conditions is derived from EIA practice. There is no guidance on establishing permit conditions, which are sometimes drafted in cooperation with ACOs. Environmental inspectors are not involved in establishing IPPC permit conditions. The public is informed about requests submitted for determining IPPC requirements and about acts stating request decisions. The deadline for informing the public is no less than 30 days.

The permit procedure is often perceived by industries as too long. Insufficient (although professional and dedicated) staff at the IPPC Unit of the MENP is only part of the problem. The integrated permit procedure suffers from a complex applications process and a lack of clarity for stakeholders. For example, there is no guidance on how to prepare an IPPC permit application, or indications on how to assess best available technology (BAT) or use best available techniques reference documents (BREF), which leads to their incorrect application. On the other side, a similar lack of clarity exists on determining permit conditions, which - besides delays - can cause interpretation problems when implementing and enforcing them. Furthermore, statutory consultants have difficulties dealing with IPPC applications because of differences with their usual media-based approach. The procedure could be shortened by simplifying the application form and providing clear instructions on filling it in, and by giving statutory consultants clear instructions on how to deal with applications and determine permit conditions. Industrial operators and ACOs could receive training on the applications process and content. Frequently asked questions could be put together on IPPC permitting and published on the Internet or distributed to stakeholders.

Lengthy communications with statutory consultants could be shortened by requesting all participants in the permitting procedure to take part in a public hearing to clarify remaining issues at the end of the procedure and thus minimize waiting for written responses on comments and questions arising at the public hearing or not solved until the hearing. The validity of an IPPC permit is five years. In the case of substantial change, the permit should be revised. No such cases have been recorded to date. IPPC permits are published on the Ministry’s website. The CEA also keeps a register of issued IPPC permits¹.

The first IPPC-related decision in Croatia was issued in 2010. In September 2013, the total number of

¹ <http://boudr.azo.hr/Akti.aspx>

installations that had received IPPC permits was 48, mostly in the sectors of farming, food industry, processing industry and metallurgy. To date, only one waste management installation (e.g. landfill) has received an integrated permit. The process of establishing requirements for existing IPPC installations has experienced delays but has recently accelerated: in March 2013, about 120 existing installations were in the permit applications process. The number of staff at the IPPC Unit has recently been increased.

The new Environmental Protection Act and its bylaws, due for implementation in 2014, will bring substantial changes. The procedure for obtaining IPPC permits will no longer be integrated with EIA procedure, and obtaining an IPPC permit will be obligatory for operators before testing out an installation. Also, the new Act introduces a simpler IPPC permit procedure for certain types of installations applying general binding rules in accordance with the Industrial Emissions Directive.

Single media permits

Industrial installations that are subject to neither EIA nor IPPC are regulated by general binding rules and by conforming to environment protection requirements included in the project design. Thus they become part of the construction permit and are added to the operation/activity permit.

Concerning air pollution, prevention and abatement limit values are prescribed for emissions of individual pollutants from stationary sources. Greenhouse gas emission allowances and emission quantities are allocated; installation operators may perform activities emitting greenhouse gases if they obtain a greenhouse gas emission permit from the Ministry of Environmental and Nature Protection.

Permits for hazardous waste management, export/import of waste, and waste incineration are issued by the Ministry of Environmental and Nature Protection. About 100 hazardous waste export and transit permits are issued per year.

The Nature Protection Directorate of the Ministry of Environmental and Nature Protection issues nature protection permits according to the Nature Protection Act for:

- Research in relation to strictly protected species or protected areas;
- Transboundary movement and trade in wild species (based on the Convention on International Trade in Endangered Species of

Wild Flora and Fauna (CITES) and EU regulation lists);

- Breeding and holding of protected species in captivity;
- Collection and commercial use of wild growing plants and protected species;
- Transboundary movement, deliberate release and placing on the market of GMOs;
- Nature protection requirements in the procedure for obtaining location permits in protected areas or included in other sector management plans (forestry, hunting, physical planning documents);
- Risk assessment studies for introducing alien species.

The transport of hazardous substances by sea is regulated by permits issued by the Ministry of Maritime Affairs, Transport and Infrastructure.

Croatian Waters remains responsible for water-related permissions, including granting water use and wastewater discharge permits, establishing water management conditions and giving water management approval. They also issue accreditation for water analysis laboratories. Major water users (> 10,000 m³/year) must obtain a concession granted by the Ministry of Agriculture with expert support from Croatian Waters. Concession terms are agreed before the delivery of the construction permit.

2.6 Compliance promotion and voluntary schemes

Compliance promotion activities are relatively limited in Croatia. The most basic activity is informing the regulated community and the public about the environmental legal framework, which is done via the Ministry of Environmental and Nature Protection website. Several guides on good environmental practices have been published, e.g. on ozone layer protection and environmentally sustainable tourism. The very narrow scope of such activities can be explained by the insufficient legal framework and capacities for such activities. Inspectors have both the right and the obligation to proceed according to the law, which means taking administrative measures, and if required legal steps, to file a charge if non-compliance is determined during inspection. Inspectors that fail to do so breach their duties and may be formally dismissed. This kind of legal framework does not leave inspectors sufficient space to promote compliance. The new Environmental Protection Act makes some progress in this direction. Croatian legislation enables the use of voluntary schemes on the environment. Thus, the 2007 Environment Protection Act established the

legal ground for the application of the European Union Eco-Management and Audit Scheme (EMAS) and designated the CEA as its national EMAS focal point. According to data in the European EMAS Registry, there are no EMAS certified Croatian companies to date.

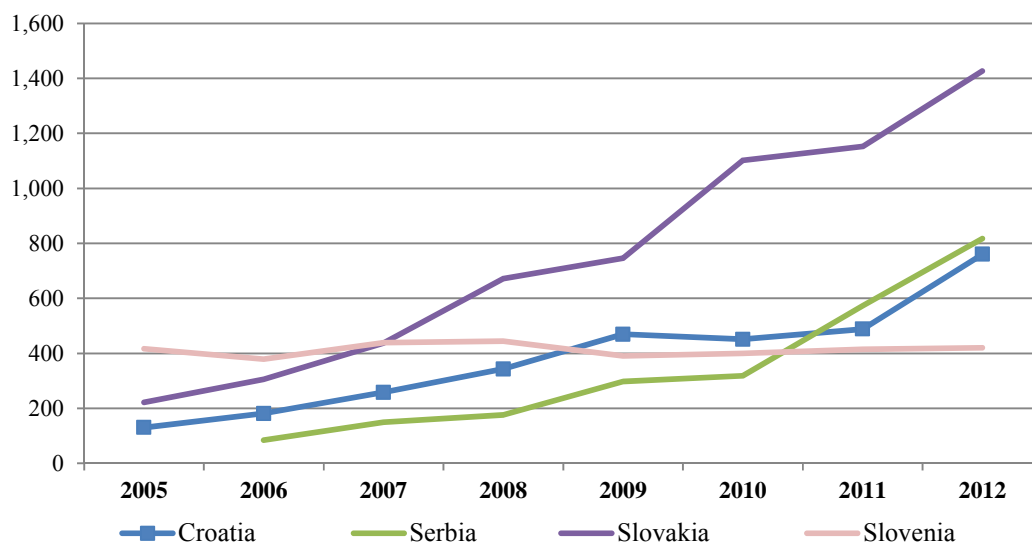
As concerns ISO 14001 certification, progress has been positive over the last decade, although far from spectacular. Within the segment of small- and medium-sized enterprises (SME), about four per cent report having ISO 14001 certification (Eurobarometer, 2012). According to the same source, the main causes of insufficient implementation of environmental management systems are as follows: (i) no legal requirement (30% of respondents); (ii) lack of information about Environmental Management Systems (EMS) and their benefits (27% of respondents), (iii) no demand from suppliers and customers (23% of respondents), and (iv) high implementation and running costs (19% of respondents).

It should be mentioned that while 44 per cent of Croatian SMEs say they fully comply with environmental law and do not intend to go any further, a relatively high share (39%) intend to become greener. These data indicate that incentives for adopting EMS could initially be provided through relatively simple means of information and education. To some extent, environmental inspectors fulfil this role, although such activities are mostly carried out by specialized institutions outside the

Government. With support from the international community, the Croatian Cleaner Production Centre develops and implements cleaner production projects; the financial savings from such activities are estimated at around 85 million HRK per year. Over 200 experts have been trained by the Centre on cleaner production and implementing environmental management systems. Complementary work on launching innovative projects aimed at sustainable development is done by the Centre for Technological Transfer established by the Faculty of Mechanical Engineering and Naval Architecture.

The Centre also provides training for experts in the industrial sector with the aim of successful technology transfer processes and increased competitiveness for domestic industry. Another important player is the Croatian Business Council for Sustainable Development. This independent, non-profit institution was established in 1997. Half of its current 40 members represent the industrial sector. It closely interacts with the Global Compact Local Network of Croatia, which was founded in 2007 and counts some 80 corporate members. More generally, corporate social responsibility issues have been integrated into the agendas of two leading business associations in Croatia since 2004 – the Croatian Chamber of Economy and the Croatian Association of Employers. Other tools in Croatia include a manual for implementing corporate social responsibility practices and a national rating system.

Figure 2.1: Trends in the number of ISO 14001 certified companies in selected countries



Source: ISO Survey 2011, <http://www.iso.org/iso/home/standards/certification/iso-survey.htm>

Environmental labelling

Since 1993 a national eco-labelling scheme (called "Environmentally Friendly") has been used to promote environmentally friendly goods on the national market. This voluntary scheme has recently been extended to the services sector and is regulated by the 2008 Ordinance on the Environmental Label (OG 70/08), amended in 2011 (OG 81/11).

Participation in this scheme is voluntary, based on the benefits for stakeholders in the private sector of improving their image by demonstrating that they have reduced environmental pollution and consumption of resources and energy. The environmental label gives consumers a clear indication of high environmental standards above the prescribed legal minimum.

The Ministry of Environmental and Nature Protection awards the Croatian Environmental Label and is the national competent authority for the EU Ecolabel. Applications must contain a study by an authorized institution or person of the products' compliance with award criteria. The award procedure involves expert assessment and public participation. The national environmental label is awarded for 3 years. As of early July 2013, 13 manufacturing companies and 15 hotel/campsite operators had been awarded the eco-label².

Environmental inspectors are obliged to check on appropriate use of the environmental label, including compliance with the original requirements, and may suggest that the MENP revoke the label.

The equivalent label for organic agricultural products is called "Hrvatski EKO proizvod" (Organic Product of Croatia). The criteria for awarding this label are stipulated in the 2010 Act on Organic Production and Labelling of Organic Products. Manufacturers may use the label if their production is certified by a certification body and if this certification is documented. The right to use the label is granted for one year or one growing season. Producers and processors must consequently reapply for accreditation every year.

In the area of energy efficiency, the Ordinance on energy efficiency labelling of household appliances (OG 130/07) has been adopted with the aim of facilitating citizens' choices towards responsible consumption.

2.7 Identification of non-compliance: self-monitoring and inspection

Industrial operators must conduct environmental self-monitoring. Aggregated self-monitoring data are reported to the Environmental Pollution Register kept by the CEA. Large installations use instrumental self-monitoring implemented by accredited laboratories. LCPs and cement plants are required to make continuous on-line measurements. If installations exceed the emission limit values they are required by law to report to local authorities and the SEI. Compliance with self-monitoring and self-reporting is verified during site visits or through a separate procedure of administrative (documentation) review.

The inspection system in Croatia largely follows Recommendation 2001/331/EC providing minimum criteria for environmental inspections, which was transposed into the 2007 Environmental Protection Act. Routine and non-routine site visits take place, as well as thematic inspections and site visits related to complaints or requests from other authorities. Inspectors are not obliged to notify the regulated entity that an on-site visit will take place, unless such a notification is beneficial.

Inspectors' authority is generally sufficient, largely corresponding to good international practice. Inspectors are required to follow standardized operating procedures that help them take consistent decisions. Their work must fully respect the public interest. They can be detached from their original location to another local unit of SEI in the interest of maintaining professional integrity.

As a result of international programmes, environmental inspectors have undergone active training over the last few years. This technical capacity is likely to remain within the competent authorities given that staff turnover is limited. The mix of specialists carrying out inspection is reported to be good (IMPEL, 2012). In the Ministry of Environmental and Nature Protection, as for all other State bodies, performance control of all civil servants (including inspectors) is obligatory and must be carried out every year.

The Ministry of Environmental and Nature Protection's DIA performs its compliance monitoring activity according to an annual work plan. This plan is published on the Ministry's website to ensure that inspection work is transparent. It is prepared in line with the environmental priorities set out in national policy documents. The objectives established in the plan are also guided by Croatia's international commitments. Inspection planning criteria are risk-

² <http://www.mzoip.hr/default.aspx?id=10460>

based and take into account the operator's performance.

The plan establishes priority sectors and specific installations to be inspected. The scope of inspection is defined based on the minimum frequency of inspection and the analysis of environmental and compliance data available from the Environmental Pollution Register and the DIA database, as well as external sources (Croatian Chamber of Economy, Croatian Chamber of Trades and Crafts, etc.). Information from local authorities is also used. The scope of inspection may be reviewed based on semi-annual reporting.

During recent years, the number of inspections carried out by SEI has been in the range of 6,000 to 7,000 per year, of which 15-20 per cent were based on complaints (table 2.2). Almost half of routine inspections require follow-up. Each environmental inspector carries out an average 80-90 site visits per year. In practical terms, the fieldwork done by inspectors in branch units is more intense since inspectors based in Zagreb are also responsible for supervision and other tasks. The workload (in terms of site visits per inspector) is comparable with that of other inspectorates covering the environmental sector.

Based on the cooperation agreement between environment inspection services, joint inspections are performed on the basis of a coordinated annual work plan. Most importantly, joint site visits are carried out at high-risk facilities. In the last few years, 54 joint inspections have been carried out annually at industrial installations; 10 joint site visits focused on nature protection, and 2 checks of former military sites with water quality problems were added in 2012 in the same coordinated framework. The findings of joint inspections are reported in separate minutes, which are sent to the inspection coordinator at the environmental inspectorate. Generally, inspections take several days and take the form of a multiple rather than integrated inspection. Inspectors from different competent authorities visit the company and inspect it regarding their specific field of competence and expertise. Apart from planned joint inspections, ad-hoc joint inspections are made with other institutions: for example, about 200 inspections were jointly carried out with the customs administration in 2012 on the transboundary movement of waste.

The minutes of the site visit include a description of the issues verified and the conclusions made on compliance with regulatory requirements. They must be signed by the inspector and a representative of the inspected operator. Records of each site visit must be

archived for five years. Joint inspection reports, prepared on the basis of individual minutes of site visits, must be made publicly available on the website of the Ministry of Environmental and Nature Protection. Inspection-related information is also kept in the Environmental Inspection Information System that was launched in 2010. In order to provide opportunities for citizens to contribute to compliance assurance, the DIA specifies the office hours during which inspectors on duty can respond to citizens' requests. For written complaints, the Act on Administration Procedure establishes a 30-day deadline for an inspector to respond to a relatively simple enquiry and up to 2 months if the requested information is very extensive and complex. No interaction with NGOs to dissuade polluters and promote compliance has been reported.

The DIA's inspection activity is relatively transparent, since the annual inspection report is posted on the Internet (however, the last annual report available comprises data from 2010). In addition, a comprehensive annual report on coordinated inspection is published. Information on water and forestry inspection activities is not readily available.

2.8 Non-compliance responses

Croatian law provides for a whole range of instruments of non-compliance response e.g. administrative enforcement measures, judicial measures (misdemeanour and criminal procedures), and environmental liability mechanisms.

Administrative enforcement

A broad range of administrative non-compliance response measures is available in Croatia, although inspectors almost always impose a corrective measure and a fine. All monetary penalties paid by companies are channelled into the State budget. Legislation provides for a gradual increase in the severity of enforcement non-compliance measures to achieve compliance, as stipulated by the Air Protection Act, for instance (box 2.1).

According to SEI data, the vast majority of non-compliance cases relate to the Waste Act, with the remainder relating to the Air Protection Act and, to a lesser extent, the Environmental Protection Act. The number of administrative measures imposed by environmental inspectors over the review period is around 2,000 per year, most of which consist in administrative decisions requiring corrective measures to be taken by the perpetrator within a prescribed period (table 2.3).

Table 2.2: Selected indicators of inspection work on the environment (number of inspections)

Indicators	2007	2008	2009	2010	2011	2012
Environmental inspection (SEI)						
Total number of inspections	6,202	6,891	6,892	7,246 ⁽²⁾	7,228 ⁽²⁾	5,931 ⁽²⁾
Routine inspections ⁽¹⁾	4,123	4,593	4,159	4,673	4,713	3,291
Follow-up inspections	2,079	2,298	2,733	1,962	1,871	1,914
Nature protection inspection (SNPI)						
Total number of inspections	..	..	722	778	789	751
Water inspection						
Total number of inspections	981	1,204	1,319	2,368	2,707	2,869
Forestry inspection						
Total number of inspections	2,650	2,644	2,521	2,661	2,401	2,393

Source: SEI, SNPI, State water inspection, forestry inspection, respectively.

Note 1: including inspections based on complaints

Note 2: including brief checks of compliance

Box 2.1: Enforcement strategy applied to air pollution cases

- In case of exceedance of the prescribed limit values for emissions of polluting substances into the air, the environment protection inspection reacts in concordance with the Air Protection Act and orders by decision and within an appropriate deadline the known polluter to carry out measures to eliminate irregularities which led to or could have led to exceedance of the limit values.
- If the supervised person does not carry out the ordered measures in accordance with the decision of the inspector, he or she will be coerced into carrying out the ordered measures through the payment of a coercive fine.
- If the supervised person does not execute the decision of the inspector even after the pronounced fine, the inspector will prohibit the use of the facility or the appliance in question.
- The inspector will forward to the competent authority an indictment charge or a criminal charge.

Table 2.3: Inspections carried out and administrative non-compliance measures taken by SEI

Indicators	2007	2008	2009	2010	2011	2012
Total inspections	6,202	6,654	6,892	7,246	7,228	5,931
Decisions on prescriptive measures	1,926	2,368	2,039	2,015	1,579	1,013
Conclusions on administrative fines	68	53	18	17	16	11
Total sum of administrative fines (HRK)	155,000	125,000	365,000	385,000	320,000	120,000

Source: SEI, 2013.

Administrative decisions are also actively used by water inspectors, who issue 400-500 such orders per year; other environmental enforcement agencies (nature protection, forestry) use administrative measures to a lesser extent (under 100 decisions per year). Environmental inspectors show a clear decreasing tendency to apply administrative fines.

Operators have the right to appeal against decisions by environmental inspectors, and an administrative dispute procedure exists if the outcomes of administrative appeal seem unsatisfactory to the operator. Appeals should be filed within 15 days of the inspector's decision or conclusion. An appeal submitted against a decision or conclusion shall not postpone its implementation if the prescribed deadlines precede the end of the appeal procedure. In the first instance, appeals are resolved by special

commissions whose members are appointed by the Minister. Administrative disputes are solved by the Administrative Court. 177 appeals were (cumulatively) filed in the period 2007-2010, most of them against inspectors' decisions/orders.

The objectivity of the appeal procedure in the first instance has raised some doubts among operators, and some of these appear reasonable, e.g. at the Ministry of Agriculture the appeal unit is part of the same sector as water inspection. In the Sector for State Water Inspection, Administrative Supervision and Appeals Procedure, there are two units: Water Inspection and Administrative Supervision and Appeals Procedure, both of which are totally independent. A government-appointed committee decides on appeals against decisions of State water inspectors.

The Environmental Protection Act (2007) provides for many cases of derogating the right to appeal against an inspection decision from the Ministry of Environmental and Nature Protection (first instance), and makes it possible instead to initiate administrative disputes (i.e. filing the case directly in the second instance – the Administrative Court). This is a deformation of the normal appeal trajectory and may indicate a lack of qualified (i.e. educated in administrative law) personnel at the Ministry of Environmental and Nature Protection unit charged with appeal affairs, who prefer to send cases to Court and avoid potential administrative supervision problems with higher competent bodies. Administrative disputes have the disadvantage of being much longer and submitting an appeal against a decision does not postpone its enforcement.

Judicial enforcement through the misdemeanour courts

In Croatia, a relatively high number of cases of environmental non-compliance are resolved through misdemeanour courts. The use of this mechanism has apparently resulted in law implementation delays, compounded by a significant backlog and the minimum period of four years to resolve a case from the date of committing the misdemeanour.

Every year, the environmental inspection files several hundreds of indictments to misdemeanour courts (table 2.4). A comparable cumulative number of misdemeanour charges are made annually by other inspections operating in the environment, namely the nature protection inspection (50-100 cases), the water inspection (50-100 cases), and the forestry inspection (400-600). For example, in 2010, the environmental inspection submitted 328 cases to the competent misdemeanour courts. In the same period, 434 decisions on environmental cases were pronounced by the courts.

Out of those court decisions, 278 defendants were found guilty and were imposed misdemeanour fines totalling over 1.1 million euro; 35 defendants were found guilty but not fined; 24 cases were rejected, while in 97 cases the procedure was suspended. This means that the courts found the defendants guilty in almost three quarters of environmental cases, which is a fairly high share. The explanation for the relatively large proportion of court decisions to suspend actions (22%) is put down to procedural aspects (exceeding the limitation period) and the complexity of environmental cases: both factors may point to the insufficient capacity of courts to treat

environmental cases and/or the courts' work overload.

In misdemeanour procedures, inspectors may be witnesses but sometimes they have the authority to investigate, prosecute, gather evidence etc. Both inspectors and attorneys can make indictments. This poses the problem of inspectors' legal competence. Related to this, the water inspection has reported that inspectors lack legal training (in addition, the inspection does not include a lawyer).

Misdemeanour courts are understaffed. Judges are not particularly specialized, despite having to base their judgments on the provisions of over 200 sectoral laws. However, they unofficially arrange for some sort of specialized advice, including on environmental matters. The courts' insufficient capacity to treat environmental cases and/or judges' insufficient environmental awareness combined with the courts' work overload sometimes lead to repeated postponements of environmental cases until the legal time expires.

Criminal enforcement

Situations leading to criminal enforcement in Croatia include, for example, illegal shipments of waste and illegal trade in protected species, major environmental threats from industrial plants or other stationary sources, illegal dumping of dangerous material (e.g. waste), pollution of the sea from ships, destruction of protected species, and habitat degradation and destruction. Areas for criminal response are outlined more clearly in the 2013 Criminal Code. The Criminal Procedure Act prescribes precautionary measures to prevent perpetrators from committing further criminal acts and to ensure perpetrators' presence in criminal proceedings, e.g. temporary seizure of passport, prohibition to engage in a certain business activity, etc. Legal entities can be found guilty through the responsible person (e.g. the manager).

The number of criminal enforcement cases is quite low and on a downward trend. In 2011, SEI submitted four criminal charges to the responsible Municipal State Attorney's Office for a threat to the environment caused by waste and other environmental pollution. Other environment enforcement agencies are no more active in pressing criminal charges: in the same year, the State water inspection, nature protection inspection and forestry inspection respectively filed one, three and five criminal charges.

Table 2.4: Judicial enforcement of environmental cases through misdemeanour courts

Indicators	2007	2008	2009	2010	2011	2012
Number of indictments filed to misdemeanour courts	614	419	419	328	839	536
Number of fines applied by the misdemeanour courts	467	432	225	278	433	341
Total amount of fines applied by the misdemeanour courts (million HRK)	5.29	10.52	8.71	8.72	5.87	4.02

Source: SEI, 2013.

At the same time, the quality of environmental crime prosecution has apparently increased over the last decade: of the 19 cases examined by the Zagreb Municipal Court in recent years, in 17 cases the perpetrator was found guilty. In case of environmental crimes, the State Attorney at municipal level is the competent body. The court (in case of environmental crimes the municipal court) is responsible for leading the criminal proceedings and for deciding on the case once the State Attorney has submitted the indictment.

In the Croatian system, the inspector can have a wide range of attributions during the criminal proceedings; he can act as:

- Inspector proper – detecting crimes and submitting criminal charges;
- Investigator – executing actions ordered by the State Attorney under the Criminal Procedure Act; when inspectors act as investigators, their inspector powers according to sectoral laws are no longer applicable, e.g. while performing evidence-collecting actions for the State Attorney;
- Witness – appearing in front of the court and reporting on their knowledge on the case;
- Source of information for the State Attorney, who may ask the inspector to gather the necessary information in order to decide whether to start criminal prosecution.

Cooperation between inspectors and prosecutors working on criminal affairs is crucial; therefore the need to increase their capacity for resolving environmental cases is recognized by both sides.

The police, including but not limited to the criminal police, are in charge of detecting and investigating crimes including environmental crimes as part of their main responsibilities. The police collect evidence, verify information received by the public, and submit criminal charges to the State Attorney. The police carry out necessary inquiries to establish whether there is direct or sufficient circumstantial evidence for criminal charges and propose prosecution to the State Attorney. The police also have a role of criminal investigator under the request,

guidance and supervision of the State Attorney. As a general rule, in cases of violation of environmental regulations (e.g. environmental pollution), the police should inform the competent environmental inspection. Furthermore they should provide assistance to inspectors in performing their duties, in case of resistance to inspectors' activities and measures.

Urgent and serious criminal offences – including crimes involving environmental pollution – require a quick reaction from the competent authorities. This is sometimes hampered by the fact that the bodies involved (e.g. bodies receiving the alarm from the State Directorate for Protection and Rescue (“112”)) cannot immediately decide who should react and how. To address such institutional issues and clarify procedural aspects, general Standard Operating Procedures (SOPs) on Environmental Crime, Environmental Misdemeanour Offences and Environmental Liability were developed in the framework of the IPA 2008 project, “Enforcement of the new Environmental Protection Act harmonized with EU legislation in cases of criminal offences against the environment”. SOPs provide Croatian environmental enforcement authorities with the necessary technical knowledge for environmental crime detection, investigation and prosecution.

Environmental liability

Environmental liability can either be civil law liability, following the principles of civil law damage compensation and dealt with by civil law courts, or what is called administrative liability, handled by the competent inspectors, e.g. environmental inspectors. Administrative liability is defined in the Environmental Protection Act and several bylaws and follows in its scope the EU Directive on Environmental Liability 2004/35/EC. It only covers damage to certain environmental resources, such as water, land, plant/animal species and their natural habitats that occurs from certain types of activities, such as waste handling or discharges into surface waters and groundwater. Strict environmental liability irrespective of fault (i.e. neither intent nor negligence are a prerequisite of responsibility) applies to these activities and all installations

requiring an IPPC permit. In the case of damage to plant and animal species and/or natural habitats, the principle of fault-based (i.e. subjective) liability applies.

Compensations for damage to individuals are handled through the civil law procedure; in some instances, damage to human health can be addressed in a criminal court. Other types of environmental liability are handled by the competent authorities. Line ministries should detect and collect evidence regarding environmental damage and ensure clean up, including cost recovery from the polluter. Customs Administration is in charge of detecting³ the illegal transboundary shipment of waste. The State Directorate for Rescue and Protection should also contribute to following up on environmental liability cases. The police have an important role in the detection of environmental damage as they often receive information from citizens regarding environmental problems. The Police should inform relevant line ministries so that they can take the appropriate steps under the environmental liability provisions.

The State bodies in charge of compensation claims are: the State Attorney, Croatian Waters or other public companies, and the county/municipality. The cost of implementing emergency measures is covered by the State budget until payment from the company obliged to implement the measures has been collected. When measures are implemented at the request of a local or regional self-Government unit, the costs are covered by the local or regional self-Government unit that submitted the request until payment is collected from the company.

Cases of environmental liability (damage compensation) are not frequent in Croatia.

2.9 Conclusions and recommendations

Regarding environmental compliance assurance, developments since 1999 have been generally positive. Most of these developments stem from aligning the country's legal basis and management practices with EU requirements, and strengthening administrative capacity to support environmental policy implementation through international

cooperation, exchange and training programmes. Croatia has introduced most of the modern instruments and procedures at all phases of regulatory management. Significant efforts have been made to ensure in practice that the system is result-oriented, risk-based, transparent, and participative. For example, the EIA procedure has been gradually enhanced with new phases such as screening and scoping. Its openness to public participation has been enlarged, and coordination with follow-up administrative procedures, such as integrated permitting, has been improved. The EIA procedure is systematically applied, and competent authorities are sufficiently critical to decline some 15 per cent of applications due to their poor quality.

Powers granted to inspectors are extensive and enable them to act swiftly on non-compliance cases. The scope of compliance monitoring is wide, with several agencies having inspection programmes, which are regularly coordinated. Coordinated site visits are conducted by various inspection authorities to reduce the administrative burden on the regulated community. Unfortunately, the interaction between different authorities is more procedural than substantive, and therefore lacks cross-cutting integration. To make enforcement more effective, the Criminal Code has been updated and extends the number of situations when criminal proceeding can be applied. Standard Operating Procedures (SOPs) have been developed and introduced to guide the enforcement procedure in areas such as environmental liability and criminal environmental law.

Some of the existing institutional arrangements pose problems. Different departments of the Ministry of Environmental and Nature Protection conduct policy-making, law development, permitting, inspection, and administrative enforcement. Performance measurement overlooks important aspects of compliance assurance, such as the stepwise use of enforcement instruments in an enforcement pyramid. Disclosure of institutional performance information through annual activity reports is irregular and sometimes lacking. Although enforcement authorities cooperate, coordination efforts still need to be strengthened. Feedback between policy-making and compliance assurance is weak, and no unit has a mandate to advise sub-national authorities and follow up on environmental policy implementation in the counties.

Recommendation 2.1:

Aiming to address the remaining governance gaps that hinder compliance assurance in Croatia, the Government should:

³ Between 2002 and 2008, 152 cases of illegal trading were prevented, followed by 199 cases from 2009-2011. Most cases concerned species of small singing birds, shells and tortoises but sometimes also big predators. For the most part, such illegal shipments are thwarted thanks to joint action by Customs and the Nature Protection Inspectorate.

(a) *Improve the set of compliance and enforcement indicators and request environmentally related inspection and enforcement agencies to publicly disclose their performance in a systematic manner;*

(b) *Continue to strengthen coordination mechanisms between various inspectorates;*

(c) *Analyze the effectiveness of environmental inspection bodies and ensure the adequate development of their administrative capacity.*

Croatia has transposed the IPPC Directive without renouncing its own regulatory approaches, although the implementation of this directive has suffered from insufficient capacity within both the public and private sectors. There is an important backlog of IPPC decisions to be issued, and the actual identification of IPPC installations is still ongoing. General binding rules are used to regulate smaller facilities. This is a well-adapted regulatory regime that, at the same time, is not sufficiently backed by compliance assistance and promotion measures.

Integrated permitting remains an area where further efforts would be beneficial. To start with, the final list of existing IPPC installations has not yet been established and made publicly available. Exact knowledge of the number of such installations is also a matter of resource allocation within the competent authorities, which seem to be understaffed. The current backlog of integrated permitting cases also reveals a technical capacity problem. The IPPC procedure is lengthy and suffers from complex application and lack of clarity for stakeholders. There are no guidance documents on preparing IPPC permit applications or determining permit conditions, or for statutory consultants to deal with IPPC applications.

Recommendation 2.2:

In order to reduce the backlog in the Integrated Pollution Prevention and Control (IPPC) permitting procedure, the Ministry of Environmental and Nature Protection should:

(a) *Complete the inventory of the IPPC installations and keep it up to date and publicly available;*

(b) *Develop guidance documents for stakeholders in the IPPC permitting procedure;*

(c) *Provide training to industrial operators and Authorized Consultancy Organizations concerning the way applications should be made and the information they should contain.*

Compliance assistance activities by the competent authorities are sporadic and limited to on-the-spot

advice during inspection. There is no unique platform for offering regulatory information to enterprises. Only a couple of guidance papers target the regulated community. No regular communication is carried out with industry associations. More generally, consultations with the regulated community are very limited, including at the law-making phase, where such an approach would ensure that regulatory goals are understood and supported. The latter is an important drawback in a situation where significant private resources will be required to comply with EU law. The value of EMAS is not adequately promoted, and there are no information-based compliance assurance tools, such as enterprise rating.

Recommendation 2.3:

The Ministry of Environmental and Nature Protection should make a better use of instruments to promote compliance, through:

(a) *Conducting consultations with the stakeholders when drafting laws or amendments;*

(b) *Providing small and medium-sized enterprises with easier access to information on how compliance could be ensured;*

(c) *Promoting the use of environmental management systems;*

(d) *Assessing the costs and benefits of a system of public disclosure and rating of the environmental performance of enterprises and adopting such a system, if feasible.*

The majority of the regulated community does not spontaneously comply with environmental law. The available data indicate an enforcement system that tends to apply fines with little recourse to other enforcement instruments. The calculation of fines does not integrate any assessment of the unlawful economic benefits of non-compliance. Many cases are transmitted to courts, where lengthy procedures are highly inappropriate for environment cases that require an urgent response. The general backlog in courts and the lack of technical capacity to understand environmental cases also diminish the effectiveness of judicial enforcement. Finally, although the legal basis for criminal enforcement has made progress, its application remains limited.

Recommendations 2.4:

The Government should strengthen the effectiveness of instruments and procedures, as well as capacity, for administrative and judicial enforcement by:

(a) *Annually assessing compliance with relevant standard operating procedures, updating them as necessary and conducting training and exchange of experience on their application;*

(b) *Providing guidance to inspectors on the use of specific enforcement instruments and requesting that the entire toolbox of administrative enforcement instruments be applied stepwise;*

(c) *Improving the calculation of*

administrative fines and informing the regulated community of the basis for such calculations;

(d) *Providing environment-focused training to judicial authorities and considering whether a specialized corps of environmental judges could be established.*

Chapter 3

ENVIRONMENTAL MONITORING, INFORMATION AND EDUCATION

3.1 Environmental monitoring

Air quality

The air quality monitoring system in Croatia consists of State and local networks that provide data for: classifying air quality into categories based on national regulations on air quality; fulfilling national and international reporting obligations and data exchange. Since 2012, State and local networks have comprised 45 automatic monitoring stations throughout the country.

The State air quality monitoring network has a total of 23 sampling points for fixed measurement (Map 3.1) of which 11 are automatic stations in settlements and industrial zones (measurements of SO₂, NO_x, PM₁₀, PM_{2.5}, O₃, CO, NH₃, H₂S, BTX, meteorological parameters and chemical analyses of heavy metals and PAU from PM₁₀ samples) and 12 are rural sites (5 sampling points for fixed measurement in national parks, nature parks and/or protected areas; 7 sampling points for fixed measurement of background pollution or long-range transboundary pollution). Since 2010, the State air quality monitoring network has been managed by the Meteorological and Hydrological Service of Croatia (MHSC). Legal persons and accredited laboratories carry out measurements, maintain stations and equipment, collect data, control quality of monitoring and air quality data, process and present results. Air Quality data must be delivered to the Croatian Environment Agency (CEA) and input into the air quality information system (AQIS) which is an integral part of the CEA National Environmental Information System. This system was established with the assistance of the Phare 2006 project "Establishment of air quality monitoring and management system".

Local networks of air quality monitoring stations are established by local and regional self-Government units. Currently local networks include 70 measurement sites. In 2012, these included 22 sampling points for fixed measurement (automatic stations), including special measurements established according to Environment Impact Assessment procedure requirements. Local and regional self-

Government units are responsible for delivering air quality data from their local networks to the AQIS at the CEA.

Water

Surface water and groundwater

Surface water is monitored at around 350 monitoring sites for inland surface waters and around 80 monitoring stations for coastal waters (Map 3.2). Groundwater quality is tested on around 250 monitoring sites, of which around 150 are in Zagreb's aquifer, 80 are in piezometers and wells in the Danube River basin, and 35 are in captured springs in the Adriatic river basin.

From 2009 to 2012, surveillance monitoring of inland surface water for the general assessment of water status in river catchment areas was carried out on 39 river monitoring sites and 5 lake monitoring sites. Operational monitoring of inland surface water is still not implemented, but the operational monitoring plan is in the process of designation. It concerns water bodies identified as not achieving good ecological and chemical status and water bodies at risk of not meeting the environmental objectives of the Ordinance on water quality standards. Surveillance monitoring of transitional and coastal water was partially conducted in 2009 and 2010, upon the revision of the existing monitoring plan and the creation of national monitoring of the chemical and ecological status of transitional and coastal water. Implementation of the proposed surveillance monitoring plan and operational monitoring started in 2012.

The groundwater monitoring network for Danube River aquifers is more extensive than for karst aquifers, although it is related to the sanitary protection zones, and covers different types of aquifer, different bodies of groundwater, and bodies of groundwater identified as at risk of not meeting water protection objectives. More stations are located in groundwater bodies at risk and in groundwater bodies belonging to primary and secondary types of aquifer than in unproductive groundwater aquifers and areas without risk.

Photo 3.1: An ancient meteorological station in Zagreb

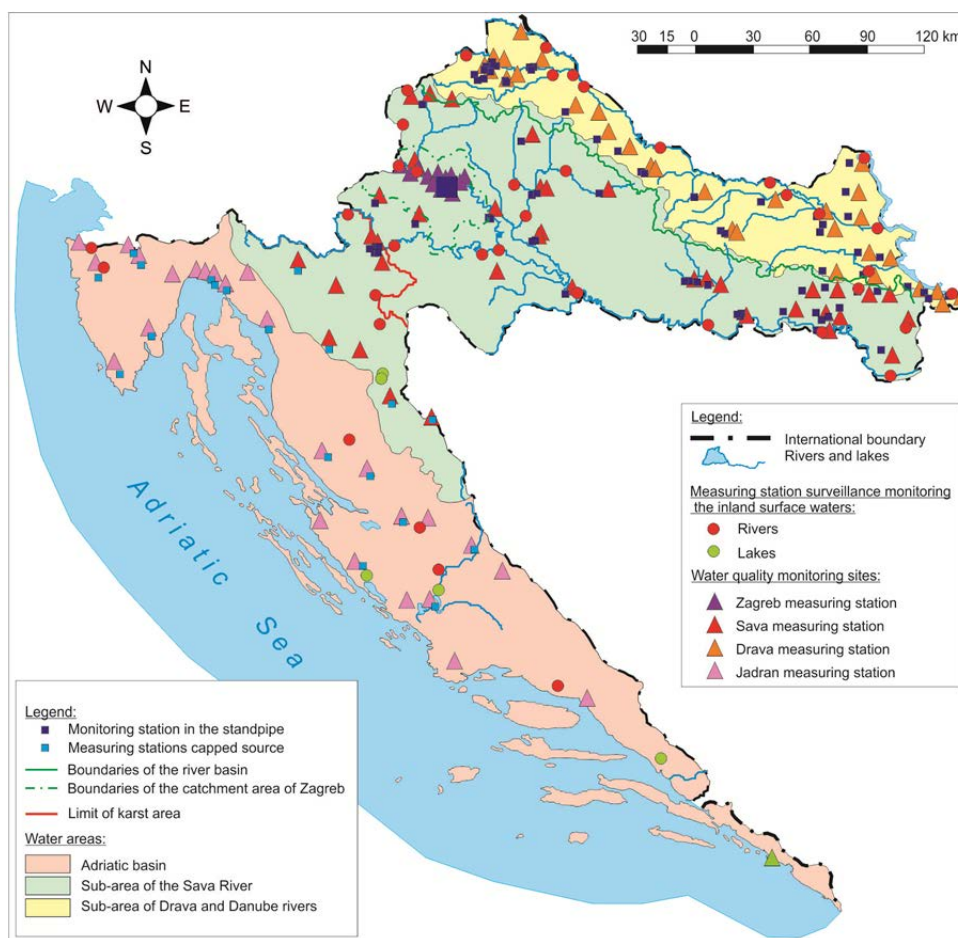


Map 3.1: Air quality monitoring sites



Source: Ministry of Environmental and Nature Protection, 2013.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Map 3.2: Monitoring sites for measuring inland water quality

Source: Ministry of Environmental and Nature Protection, 2013.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Table 3.1: Water monitoring stations, number

Year	2006	2007	2008	2009	2010	2011	2012
Inland surface water	331	348	324	349	318	310	378
Groundwater	188	212	216	249	256	270	270
Transitional and coastal water	75	75	75	75	75	75	80

Source: Croatian waters, 2013.

Bathing water

Croatia is highly dependent on tourism and therefore its bathing water monitoring programme is very important and well established. Croatia has been reporting to the European Commission on sea bathing water quality since 2009. Reporting on inland bathing water quality started with the 2011 bathing season. These reports cover: start and end of bathing season for each bathing water, short-term pollution events, events impacting bathing water quality and measured values of concentrations of two microbiological parameters — intestinal enterococci and *Escherichia coli* (also known as *E. coli*). This report gives a general overview of bathing water

quality in Croatia for the bathing season. A total of 919 bathing water sites were monitored in Croatia during the 2011 and 2012 bathing seasons. Of these sites, 886 were coastal bathing waters, 26 transitional bathing waters and 7 were inland bathing waters (4 on rivers, 3 on lakes).

Marine water

The national marine monitoring programme “Adriatic” has been in operation since 1998 and contains 2,500 time series, but because of a lack of funding, the programme was significantly reduced in 2012. Marine physics, chemistry and biology are measured. Besides the national marine monitoring

programme, different aspects of marine environment are monitored by various institutions. The administrative responsibility for monitoring is dispersed among different ministries and State institutions.

The monitoring and observation system is currently being prepared in the forthcoming Marine and Coastal Management Strategy. Work is underway to link all existing marine monitoring activities and develop new ones in order to increase coherence and coordination of marine environment monitoring to achieve the goal of good environmental status. The Ministry of Environmental and Nature Protection coordinates the preparation of the monitoring and observation system through implementation of the Coastal Cities Water Pollution Control Project 2.

In the first preparatory document of the Marine and Coastal Management Strategy named “Initial Assessment of the State and Pressures on the Marine Environment in the Croatian Part of the Adriatic Sea”, the data that have been processed and analyzed include: quality of transitional, coastal and marine waters, oceanographic and hydrographical conditions, hazardous and harmful algal blooms, sea bathing water quality, marine pollution caused by maritime transport, invasive species, marine pollution incidents and interventions against accidental marine pollution, and radioactivity in marine environment. Other important data are collected and analyzed to monitor quality and pressures on the marine environment and coastal areas, including relevant spatial data, information on infrastructure, and data on marine and coastal area protection policy.

Drinking water

Croatia takes measures to ensure regular monitoring of the quality of water intended for human consumption. The National Institute of Public Health monitors water quality in public water supply systems. Monitoring is carried out to ascertain whether the water available to consumers meets the requirements of the Act on Water for Human Consumption (OG 56/13).

Radioactivity

The ambient gamma dose rate is continuously monitored at 25 stations (Map 3.3) as part of the EU early warning system (European Radiological Data Exchange Platform) for radiation detection emergency. Two stations also measure the concentration of radionuclides in the air and some meteorological parameters. Ten new stations are planned. The nuclear power plant in Krško (jointly

owned by Croatia and Slovenia) has its own monitoring system, which is managed by the Croatian Ruđer Bošković Institute.

Monitoring in other relevant areas

Monitoring of biodiversity is very limited. Only some species, such as river turtles (*Mauremys rivulata*) and Lombard frogs (*Rana latastei*) have been inventoried, as well as big carnivores such as wolves and lynxes. Manuals have been produced on making inventories and monitoring habitats, educational workshops have taken place, and an inventory of habitats is underway.

Standards have been agreed for establishing a system for monitoring agricultural land in accordance with the provisions of the Ordinance on the Methodology for the Monitoring of Agricultural Land (OG 60/10). In operational terms, measures for monitoring agricultural land have not yet been implemented.

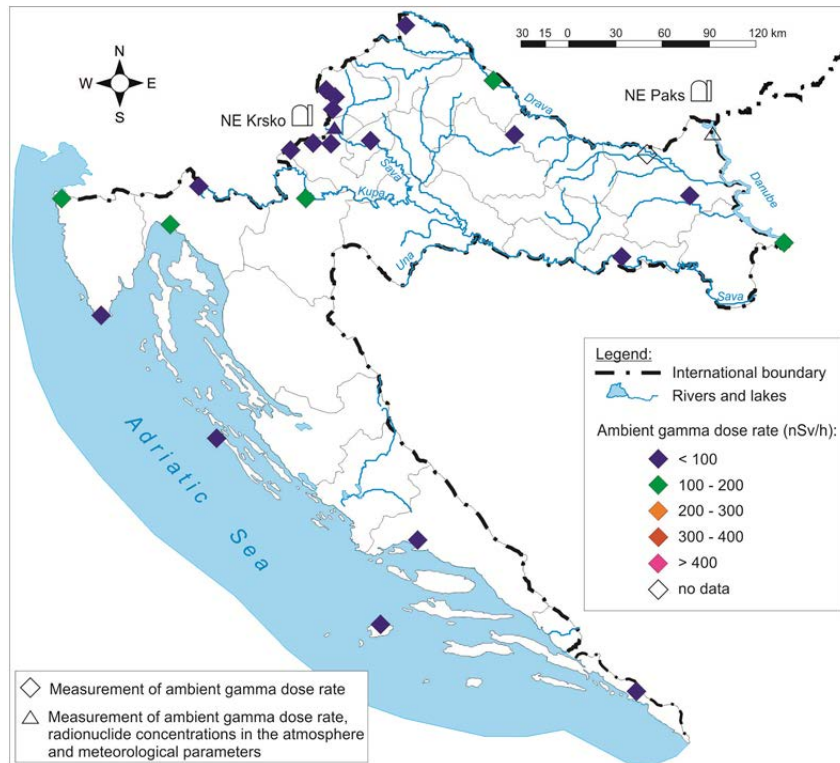
There appears to be no monitoring of biodiversity, soil, noise and vibration.

3.2 Environment reporting and information systems

Data reporting

A National GHG registry, an inventory and reporting have been established alongside the EU ETS (Emission Trading System). Since the beginning of 2013, the National GHG registry has been linked to the European Union Registry and is fully operational. The most significant development to date was the establishment of the Environmental Pollutant Register (EPR) in 2005. The register comprises components regarding numerous national and international obligations. It is based on the Regulation concerning the establishment of European Pollutant Release and Transfer Register (OG 166/06). At the end of 2012, CEA launched the Croatian National Portal on Emission Pollution Register (CNPEPR). CEA has also launched the EPR Public browser for data from EPR and published the Manual for Keeping the Environmental Pollution Register, containing instructions on working with the EPR and procedures for data quality assurance. It also runs an EPR Help Desk.

Data flow for EPR is regulated in the following way. A party obliged to submit data delivers the data to the competent authority (21 administrative bodies in 20 counties and the City of Zagreb). The competent authority cooperates with the competent inspection to verify that the data submitted are complete, consistent and authentic.

Map 3.3: Radioactivity

Source: Ministry of Environmental and Nature Protection, 2013.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

CEA coordinates activities on data quality assurance and control. Since 2012, CEA has maintained a list of polluters, also published on the Internet. Information for the Environmental Pollutant Register is collected by the State Environmental Inspectorate and sent to CEA.

Data on quantities of generated, collected, processed, deposited and exported waste are collected as a part of the CEA waste management information system. The waste producer/certified person for waste management delivers data on waste to the EPR annually. In case of emissions, the frequency of measurements is determined by special regulations on air and water protection and depends on the type and capacity of the facility in question. In 2012, an agreement was established between CEA and the Croatian Bureau of Statistics for CEA to produce information which is collected through permits and using statistics quality standards.

Environment information system

Under the Croatian environment information system (CEIS), a process is under way to inter-connect various databases (about 44). CEIS subsystems include: air and climate, marine environment, nature protection, soil, waste, industry and the energy sector, health and safety, and general issues related to

environmental protection. CEA is gradually improving its databases in all subsystems. To prepare suitable information to support national and international reporting and data exchange and public data availability, CEA works on linking relevant databases located at different institutions.

The Ministry of Environmental and Nature Protection is currently discussing the modalities of acquiring spatial planning data with the Ministry of Construction and Physical Planning, land use and land cover data with the Ministry of Agriculture, and noise data with the Ministry of Health.

Databases in the CEIS are quality checked four times per year on: reporting timelines to CEIS databases, authenticity, accuracy and completeness, and coverage of reported information according to agreements or reporting needs. Some CEIS databases are maintained by other institutions (responsible for monitoring or data collection). Acquiring data for CEIS from other databases is generally time consuming and intensive in terms of human resources. For example, the water information system is under the responsibility of Croatian Waters; to access its data, CEA must make an individual request, followed by manual copying and pasting for CEA database management. In some case, due to

different working methods and fragmented data sources, data are not harmonized or interconnected.

The establishment of environmental information systems follows the Shared Environmental Information System (SEIS) principle of decentralized management (and thus access of data at source).

CEA has established a working group for the Infrastructure for Spatial Information in the European Community and is in the process of establishing a cadaster of the main objects of environmental protection, e.g. big polluters, water treatment plants, nature protected areas and monitoring stations (location, entity, address). In line with the principles and activities of the European Earth Observation Programme, where remote sensing is used to acquire data (Copernicus, previously GMES), the Croatian Corine Land cover database was updated in 2000, 2006 and 2012. The Corine land cover database is the only land use/cover information available at national level. It includes more detailed coastal and forest information taking into account Croatia's specific interest (i.e. additional climate change data, five themes elaborated in higher resolution layers 1:25000).

Reporting according to international obligations

Since 2005, there has been significant improvement of reporting regarding international obligations. For example, EEA priority data flow reporting increased from 17 per cent in 2005 to 89 per cent in 2011.

CEA is the central information body for coordinating reporting and reporting to the European Commission on the implementation of specific environment protection regulations, to the EEA, and to the European Environment Information and Observation Network (EIONET). Institutions that report environmental data and information to international organizations and the European Commission must provide CEA with a copy of the report or data.

CEA has established a database of all environmental reporting obligations (around 245) and an overview of institutions involved in such reporting. CEA has started to establish protocols to identify reporting responsibilities from various institutions to CEA. Protocols exist for cross-sectoral collaboration in data flow and for the production of reports and reporting in accordance with Croatian reporting obligations. One protocol has been established so far with the Ministry of Interior on data and information relating to monitoring and reporting average CO₂ emissions

from light commercial vehicles and average CO₂ emissions from passenger cars.

Environment assessments and access to information

Preparation of the state of the environment report (SoER) is laid down by the 2013 Environmental Protection Act. CEA has the overall responsibility to prepare the SoER and submit it to the Ministry of Environmental and Nature Protection. As prescribed by the EPA, the report covers four years, and has to be approved by the Government and adopted by the Croatian Parliament. The authorized delay between considering data and finalizing the reporting is one and a half to two years, which is standard for this type of comprehensive document. The Croatian SoER contains 17 different environmental themes and themes regarding sectorial pressures and responses. The adoption procedure is rather long with the result that the data provided are outdated for information and policy purposes. The preparation of the draft report 2009-2012 is under way.

The report is prepared on the basis of available environmental data and gives an evaluation of the current state and a forecast of the future state. The Environmental Protection Act stipulates that SoER reporting must be linked to the Strategy of Sustainable Development and the Plan for the Environment Protection. So far SoERs have been published in 1998, 2002 (not endorsed by Parliament), 2007 (1997-2005 data coverage) and 2012 (covering 2005-2008). The 2007 report was the first indicator-based report (inclusion of 198 indicators) and covered all thematic areas of the environment, pressures and responses, and overviewed the goals achieved from the 2002 National Environment Action Plan.

To mitigate delays in compiling and adopting the SoER, CEA has started to publish a selective series of annual indicators in the publication "Selected indicators of the environment in Croatia" and the publication "The Environment in your Pocket". The national list of environmental indicators is based on the 2007 Environmental Protection Act and other sectoral requirements for environmental data and forms part of the CEIS. Currently the list comprises 245 indicators; it is harmonized with the EEA list of indicators and available on the web. The list of national indicators is revised every two years. Not all indicators are supported by data.

Information on the environment in Croatia is publicly available in the form of published reports,

publications, CEIS databases on the web or by request.

Access to some CEIS databases requires account registration. Helpdesks for the GHG registry and the Environmental Pollutant Register have been established at CEA. The use, accessibility and quality of environmental information have rapidly improved thanks to these CEA establishments. NGOs have recorded improvements and the possibility of acquiring personal details for further inquiries. Documents and templates are available on the CEA website along with the names of staff to contact with inquires.

Data on monitored bathing water have been available to the public online since 2009. Moreover, users can make comments and suggestions on individual bathing water points, propose new sampling points, obtain additional information on beaches and report any sudden or short-term pollution. A web application for mobile phones and other small-screen devices was produced for the 2012 bathing season. Bathing water profiles are available for most bathing waters⁴.

3.3 Legal, policy and institutional framework

Legal framework

The scope of environmental monitoring is defined by the 2013 Environmental Protection Act. It includes the monitoring of air, water, sea, soil, flora and fauna, exploitation of raw minerals, emissions into the environment, the impact of environmental pollution on human health, the impact of significant economic sectors on environmental components, natural phenomena, meteorological, hydrological, erosion, seismological, radiological and other geophysical phenomena, and the conservation status of nature. Ordinances regarding monitoring details must be issued by the responsible ministry. This type of ordinance has been issued for most environmental themes, but some lack implementation (e.g. soil). In addition, the Environmental Protection Act stipulates that national reference centres must be established or appointed by the Government to perform monitoring, establish information outlets and report. Only one such centre, for marine water, has been established so far.

The air quality monitoring and management system in Croatia is regulated by the Air Protection Act (OG

130/11) and by secondary legislation, such as the Ordinance on Recommended and Limit Air Quality Values, adopted before 2009, which is under the process of further harmonization.

Since 2002, the State air quality monitoring network has followed the Ordinance on locations of permanent air monitoring stations in the national network, and the Programme on air quality measurement in the national air quality monitoring network.

Water monitoring is set out in several pieces of legislation: the Water Act, Environmental Protection Act and Act on Water for Human Consumption. The Water Act and its by-laws regulate the monitoring and assessment of ecological status and chemical status of surface water (including transitional and coastal water), the chemical status and quantitative status of groundwater, and the water status in protected areas. The monitoring of inland bathing water quality is also regulated by Water Act.

The Act on Water for Human Consumption regulates the monitoring of sanitary validity of water for human consumption. Marine water monitoring in compliance with the Regulation Establishing a Framework for Action of Croatia in the Field of Marine Environment Protection (OG 136/11) and the monitoring of coastal bathing water quality are based on the Environmental Protection Act.

The new Water Act in 2010 provided the legal framework to establish harmonized monitoring. In 2011 the Ordinance on water quality standards entered into force, laying down criteria for assessing the ecological and chemical status of surface water, the chemical and quantitative status of groundwater, and criteria for assessing the status of water in protected areas. It also introduced the type-specific assessment of surface water status. The new Ordinance on water quality standards also includes provisions for assessing and monitoring water status. In addition, the River Basin Management Plan (OG 82/13) initiates a monitoring programme scheduled to run until the end of 2015.

The criteria for monitoring and assessing the ecological and chemical status of surface water, the chemical and quantitative status of groundwater, and the status of water in protected areas is stipulated in the Regulation on water quality standards (OG 73/13), adopted after the last amendments to the Water Act. For surface water, it sets out assessment methods and type-specific environmental quality standards for biological and hydromorphological quality, together with limit values for chemical and

⁴ Bathing water results 2012 – Croatia, <http://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water>

physico-chemical quality and priority substances. For groundwater, it stipulates the limit values for nitrates, pesticides and specific pollutants.

The Regulation on coastal bathing water quality (OG 73/08) regulates the monitoring of coastal bathing water quality, while inland bathing water quality is covered by the Regulation on bathing water quality (OG 51/10).

Prior to the adoption of the Regulation Establishing a Framework for Action of Croatia in the Field of Marine Environment Protection (OG 136/11), assessment and monitoring programmes for marine environment were conducted separately in line with sectoral legislation, and some descriptors of good marine environmental status (e.g. marine litter and underwater noise) were not assessed or monitored at all. A monitoring and observation system is currently being prepared in line with an initial marine environment assessment; it includes monitoring of all descriptors of good environmental status based on an indicative list of characteristics, pressures and impacts defined in the Regulation (OG 136/11). Current reporting requirements oblige all responsible institutions to make available to CEA all data and information gathered in the initial assessment and in the monitoring and observation system to serve the needs of CEIS and the European Environment Agency.

Noise monitoring is regulated by the 2009 Act on noise and the Ordinance on strategic maps for noise (OG 5/07). However, these are not implemented in practice. For soil monitoring, the Ordinance on the Methodology for the Monitoring of Agricultural Land (OG 60/10) regulates methods for monitoring the state of agricultural land and conditions for carrying out analyses, which must be performed by accredited laboratories. The provisions of the Ordinance relating to monitoring have not yet been implemented.

Radioactivity is monitored on the basis of the Act on radiological and nuclear safety (OG 28/10), the Ordinance on monitoring radioactivity in air, soil, sea, rivers, lakes, groundwater, precipitation, drinking water, food, occupational space and dwellings (OG 60/08), and the Regulation on the conditions and methods of disposal of radioactive waste, spent sealed radioactive sources and ionizing radiation sources not intended for further use (OG 44/08).

The monitoring of nature conservation status is regulated by the Nature Protection Act (OG 80/13).

Policy framework

CEA prepared a programme for CEIS management for the period 2009-2012. A programme for 2013-2016 has been drafted.

Institutional framework

The Government established the Croatian Environment Agency (CEA) in June 2002. CEA's tasks and obligations were defined in the 2002 Regulation on the establishment of the Croatian Environment Agency, followed by the 2007 Environmental Protection Act, and more recently the 2013 Environmental Protection Act. CEA's core task is to establish, maintain and coordinate a single national environmental information system, maintain appropriate environmental databases and report on environmental status in relation to environmental protection and sustainable development. CEIS was established following the Regulation on the Environmental Information System (OG 68/08). Other main institutions, defined by specific regulations, are responsible for monitoring particular areas. Specifically:

- Supervision of air quality monitoring is under the responsibility of the Ministry of Environmental and Nature Protection, and performed by the Meteorological and Hydrological Service and local networks under local and regional self-governments. Air quality warning is the responsibility of the Ministry of Environmental and Nature Protection and regional level institutions.
- The responsibilities for water monitoring are shared between:
 - Croatian Waters for surface water, groundwater and inland bathing water (monitoring and establishing and maintaining information system of all surface and ground waters, transitional and coastal waters concerning their chemical and ecological status, territorial sea waters concerning their chemical status, mineral and thermal waters, except mineral and geothermal waters suitable for extracting mineral raw materials or for using accumulated thermal energy for energy purposes). Croatian Waters, in cooperation with the Meteorological and Hydrological Service, covers issues of monitoring water quantities and hydrometeorological forecasts, particularly in the implementation of flood protection plans.

- Drinking water responsibility is shared between the Ministry of Agriculture and the Ministry of Health. Water quality is monitored by the National Institute of Public Health.
- Coordination of marine environment monitoring is the responsibility of the Ministry of Environmental and Nature Protection, while other responsible bodies including ministries, the State and scientific institutions participate in and conduct marine monitoring activities within the scope of their competence:
 - Coastal bathing water quality is monitored by the National Institute of Public Health in seven coastal counties;
 - Monitoring of characteristics and marine environment features (e.g. hydrographical, physical, geological, chemical, biological) and pressures (e.g. physical loss, contamination by hazardous substances, eutrophication, biological disturbance) are implemented by marine scientific institutions (Institute of Oceanography and Fisheries, Institute “Ruđer Bošković”, Institute for Marine and Coastal Research from the University of Dubrovnik, Hydrographic Institute), public health institutes in coastal area and State institutions (e.g. State Institute for Nature Protection, Meteorological and Hydrological Service, State Office for Radiological and Nuclear Safety). Besides the Ministry of Environmental and Nature Protection, other ministries hold administrative responsibilities for monitoring activities (e.g. ministries responsible for maritime transport, fisheries, science and water management).
- Biodiversity monitoring is under the responsibility of the Ministry of Environmental and Nature Protection, the State Institute for Nature Protection, and the Institute of Oceanography and Fisheries. Monitoring of forest ecosystems is under the responsibility of the Ministry of Agriculture and performed by the Croatian Forest Research Institute.
- Soil monitoring of agricultural and forestry land comes under the Ministry of Agriculture, with potentially contaminated and contaminated sites coming under the Ministry of Environmental and Nature Protection.
- Monitoring of emissions released into water, wastewater, PRTR and IPPC is the responsibility of the Ministry of Environmental and Nature Protection.
- Waste falls under the competence of the Ministry of Environmental and Nature Protection and the administrative departments of county offices.
- Radioactivity is the responsibility of the Institute for Nuclear Radiology. The Institute performs monitoring, reports to the Joint Research Centre in Ispra, Italy, and since 2013 reports to the EC (including data for the last ten years). The Institute also issues permits for emitting radiological substances into the environment and monitors sources for drinking water for the Ministry of Agriculture and the Ministry of Health.
- For noise, the responsible institution is the Ministry of Health.
- Vibrations come under the responsibility of the Ministry of Construction and Physical Planning.

3.4 Environmental education

Environmental education comes under the responsibility of the Ministry of Science, Education and Sports and the Education and Teacher Training Agency. It is based on the Act on Preschool Education (OG 10/97), the Act on Education in Primary and Secondary Schools (OG 87/08), the 2003 Act on Institutions of Higher Education, and the 2003 Act on Science and Higher Education. In addition, pursuant to the EPA (OG 110/07), the environment and education ministries collaborate to create guidelines for education on sustainable development.

Education on sustainable development is based on the Croatian National Educational Standards for pre-school, primary and secondary education (OG 63/08), the 2010 National Curriculum Framework for primary education and secondary education, the 2009 Strategy for Sustainable Development, the 2011 Action plan for education for sustainable development, and the Strategy for development of vocational education for 2008-2013. The 2011 action plan results from collaboration between the Ministry of Science, Education and Sports and the Ministry of Environmental and Nature Protection in cooperation with relevant stakeholders. The action plan is part of the national curriculum and based on the Strategy for Sustainable Development. Environmental education is one of the strategic goals of the National Biodiversity Strategy and Action Plan (NBSAP), which identifies educating and informing the general public as crucial to promoting biodiversity conservation.

A long-term strategy on curricula, including for pre-school institutions, is in preparation and scheduled to be ready for consultation with interested parties by October 2013. The Government working groups that have been set up to work on the strategy do not include the Ministry of Environmental and Nature Protection. Kindergartens, which are more advanced in implementing eco programmes, also act as training centres for teachers through relevant eco programmes. Since 2006, around 40 experts have been trained on this programme each year.

The national curriculum framework defines environment protection as a cross-disciplinary topic, together with health, civic education and security. It is available as a subject of choice (i.e. application ecology) among other subjects. Courses are on offer at an experimental gymnasium for sustainable development in Split. Around 200 eco-schools and 130 schools in Croatia are part of the Global Learning and Observations to Benefit the Environment (GLOBE) programme⁵.

At university level, ecological education is part of natural and social science education and is in most cases linked to sustainable development. For example, the University of Zagreb offers an undergraduate Environmental Science programme, a graduate programme on Environmental Science and a graduate programme on Ecology and Protection of the Environment. Čakovec University provides courses on construction for sustainable development. Post-graduate studies exist within programmes for sustainable construction, sustainable development management (in Zagreb), sustainable development management in tourism (in Opatija), along with an interdisciplinary PhD programme at the University of Osijek: Nature and Environmental protection.

The Education and Teacher Training Agency and the Agency for Vocational Education and Training and Adult Education offer teachers annual specialized seminars on environmental subjects (for chemists, biologists and geographers for primary and secondary schools).

The Ministry of Science, Education and Sports promotes education for sustainable development in cooperation with civil society organizations.

3.5 Conclusions and recommendations

The establishment of the Croatian Environment Agency (CEA) has led to progress in the organization of environmental information and reporting systems

in Croatia. The period since the establishment of CEA has been marked by the transition and accession period to the EU, which required adapting the national legislative framework. At the same time, efforts were focused on customizing data (e.g., collection, methodology approach, quality assurance and quality control). Data flow functionality is an ongoing process within the CEIS, following SEIS principles. Some pieces of legislation (ordinances and regulations) related to environmental information and institutional responsibilities are still being revised and adapted to meet with EU requirements. The process has resulted in new structures in the country as well as new reporting obligations.

Despite the progress, outstanding issues include: problems with incoming data that are sometimes not validated, processed, harmonized or available on a timely basis; difficulties connecting to other institutions' IT platforms (e.g. databases); not all requirements for building a shared CEIS have been covered by legislation; funding for information systems databases development is decreasing; and some capacity gaps by CEA experts.

Existing environmental data subsystems are compilations of numerous databases that are often not connected. If protocols continue to be established for small areas of information, there is a risk that an opaque and unmanageable mechanism will result.

Recommendation 3.1

The Ministry of Environmental and Nature Protection, in cooperation with other relevant public authorities and other stakeholders, should continue working towards the establishment of an integrated environmental information system that should provide relevant, comprehensive, accurate and publicly accessible data and information on the state of the environment. Future steps should include:

(a) *Strengthening the coordinating role of the Croatian Environment Agency (CEA), with the means for enhancing database development and ensuring adequate knowledge coverage across all issues;*

(b) *Establishing further National Reference Centres to collect data and report to CEA and other responsible bodies;*

(c) *Continuing the establishment of protocols for data flow, including workflow definitions (precisely defining who reports what, when and to whom), protocols on higher levels of information subsystems to avoid segregation of the whole system and the definition of standards to regulate methodologies and procedures in the creation, access, protection and uniformity of*

⁵ <http://www.globe.gov/about-globe>

environmental data and information in the related institutions.

The review of monitoring activities in Croatia reveals that biodiversity, soil, noise and vibration are not monitored regularly. The timely preparation of project documentation, issuing of permits (i.e. IPPC), and preparation and use of assessments in policymaking are jeopardized by information gaps, inadequate coverage and frequency of monitoring in some areas, and too general and highly aggregated information. Methods and measurements used in some cases are not compatible with international standards, so that delivered data need further interpretation (e.g. GHG emission data are different for E-PRTR and the Emission Trading System; emission data on water from CEA and Croatian Waters are also different).

Some laboratories and measuring stations need to improve data quality assurance/ control. Existing monitoring networks need constant upgrading and maintenance to keep them operational. Responsibilities are unclear and overlap in some areas. Water-related monitoring (including health) should be more fully integrated into the overall environmental information system.

Recommendation 3.2

The Ministry of Environmental and Nature Protection, in cooperation with other relevant public authorities, should prepare a scoping and evaluation study of existing environmental monitoring (including monitoring on national borders), its links to environment reporting (state-of-the-environment (SoE) reports and reporting according to international obligations) and mechanisms for its continuous updating and regular implementation across all areas (air, water, soil, land use, biodiversity, waste, noise and vibration, and radioactivity).

The procedure for adopting state of environment reports (SoER) is too complicated and lengthy. Adopting a national SoER takes over two years. As reports include an assessment of the relevance to implementing environment-related strategies and programmes, this duration needs to be significantly reduced.

Recommendation 3.3

The Government should speed up the procedure for the approval of the SoE report, in order to produce more timely outputs for policy and information purposes.

The Croatian environmental information system is based on the principle of a shared environmental information system, which brings many advantages for its further application and use. The reporting system and accessibility to data and indicators relevant for state-of-environment reporting need further development (e.g. digital data flows and workflows, web accessibility, updating frequency).

Recommendation 3.4

The Ministry of Environmental and Nature Protection, through CEA, should:

- (a) Establish an indicators database and make it available via the Internet;*
- (b) Prioritize environmental data flows and develop e-based data exchange protocols, and web portals for stakeholders (e.g., regions and business);*
- (c) Work towards making most of the data available at the sources and usable for established e-reporting.*

Solid improvements and results have been recorded in education on sustainable development, including environmental education at all levels of the education system, especially for young children. However, whole life education has not been implemented much, and more possibilities could be established for older people.

Currently, education is mostly focused on science and technology. However, the environment is a very local issue and highly diverse. Curricula do not currently take sufficient account of regional differences regarding the issues and needs of environmental education.

Recommendation 3.5

The Ministry of Science, Education and Sports should strengthen education for environment protection and sustainable development in the national education curriculum.

Chapter 4

IMPLEMENTATION OF INTERNATIONAL ENVIRONMENTAL AGREEMENTS AND COMMITMENTS

4.1 Major developments since the first EPR

Since 1999 Croatia has ratified 22 multilateral environmental agreements (MEAs) (Annex II). The EU accession process contributed to a modification, refinement and reformulation of many of the laws and secondary legislation. The process of pre-accession negotiations and harmonization of the domestic legislation with that of the EU helped Croatia to continue, or even start in some cases, the implementation process. Full implementation of the MEAs is lacking at the level of regional and local self-governments.

4.2 Framework for international environmental cooperation

Policy and legal framework

The 2007 Environmental Protection Act (EPA) was the main legislative document that defined Croatia's objectives regarding international environmental cooperation. Concrete priority areas with significant international areas, as identified in the EPA, are: air, nature, marine and inland water protection, and waste and chemicals management. A new Environmental Protection Act (OG 80/13) replacing the previous EPA was adopted in 2013 (Chapter 1).

The Ministry of Environmental and Nature Protection acts as the national focal point for most environment-related international agreements. In some areas, such as international cooperation on chemicals management, energy or spatial planning, responsibilities are shared with other ministries like the Ministry of Construction and Physical Planning, the Ministry of Agriculture, the Ministry of Maritime Affairs, Transport, and Infrastructure, the Ministry of Health, and the Ministry of Science, Education and Sports.

The Croatian Environmental Agency (CEA) reports and coordinates reporting duties towards the EEA relating to implementing MEAs and relevant data collection, while the relevant ministries report on the implementation of UN MEAs.

4.3 Global multilateral environmental agreements

Biological diversity

Croatia is party to the Convention on Biological Diversity (CBD). Croatia adopted its first National Strategy and Action Plan for the Protection of Biological and Landscape Diversity in 1999. This strategic document, which outlined the long-term goals and their implementation, gave impetus to the adoption of the Nature Protection Acts in 2003 and 2005, with amendments in 2008 and 2011, as well as the new Nature Protection Act in 2013. A new National Strategy and Action Plan was adopted in 2008. In 2007 Croatia published the Report on the State of Nature. A new Report is being drafted, and will be the basis for preparing the new revised NBSAP in 2014.

Through these instruments, Croatia has largely fulfilled obligations ensuing from its commitment to the main global environmental instruments concerning biodiversity and nature protection. Croatia has established a sound biodiversity conservation system. In addition to the Ministry of Environmental and Nature Protection, the State Institute for Nature Protection (SINP), the central expert body for nature protection, plays a decisive and positive role in implementing the CBD. It is the key institution in the process of identifying areas of natural value and determining the desired level of conservation. It plays a decisive role in the management of protected areas and use of natural resources, ensures regular reporting on the state of nature and also plays a significant role in promoting the need to protect nature (through educational activities and promotion).

Croatia has made considerable effort in mainstreaming biodiversity in other sectoral policies, in line with CBD Strategic Goal "A" in the CBD Strategic Plan 2011-2020. "Horizontal" success stories include the development of an Agri-environmental Programme 2007-13 and strong and

fruitful cooperation between stakeholders in forest management areas.

In 2003 Croatia ratified the Protocol on Biosafety to the CBD and is currently setting up a comprehensive legislative and institutional system of GMO application control. In 2005 two main acts were adopted (the GMO and Food Acts) with the Ministry of Health as the central, coordinating body for managing GMOs. In 2013 the Act on Implementation of the Regulation (EC) No. 1946/03 on transboundary movements of GMOs was adopted (OG 81/13).

Since ratifying the CBD Convention, Croatia has so far submitted four National Implementation Reports.

Croatia also ratified in 2000 the Bern Convention on the Conservation of European Wildlife and Natural Habitats and the Convention on the Conservation of Migratory Species of Wild Animals (CMS). Under CMS, Croatia ratified the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), the Agreement on the Conservation of Populations of European Bats (Eurobats) and the Agreement on the Conservation of Cetaceans of the Black Seas, Mediterranean and Contiguous Atlantic Area (ACCOBAMS). Croatia is also a signatory of the memorandums of understanding concerning Conservation Measures for the Slender-billed Curlew and on the Conservation and Management of the Middle-European Population of the Great Bustard.

Wetlands of international importance

Croatia has been party to the Convention on Wetlands of International Importance, especially Waterfowl Habitat (Ramsar Convention) since 1991 and has five declared Ramsar sites, namely the Crna Mlaka, Neretva River Delta, Lonjsko Polje and Mokro Polje, Kropacki Rit Nature Park and Lake Vransko, which was designated in 2013. Altogether the designated area of wetlands of international importance covers 94,358 ha. Five national implementation reports have been submitted by the country so far. Croatia is fulfilling its obligations stemming from membership of the Ramsar Convention.

International trade in endangered species

Since its ratification of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2000, Croatia has submitted 3 national biannual reports (with the exception of the biennium 2005-6). The biennium

2009-10 was the only one to report violations of national law (numbering 53). Considering the richness of Croatian biodiversity and its geographical position (six ports of international importance), CITES plays an important role in the country. The main legislative document regulating the trade in protected species is the Act on transboundary movement and trade in wild species (OG 54/13) adopted in 2013.

In 2009, Croatia hosted the first regional CITES workshop in which delegates discussed most urgent issues related to wildlife trade in the subregion (illegal trade in tortoises and illegal hunting of small birds). Croatia has been conducting yearly national workshops since 2003 to train customs staff, inspectors and border and crime police.

Desertification

In 2000, Croatia ratified the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD). The main responsible authority for the coordination and implementation of UNCCD is the Ministry of Environmental and Nature Protection, but other ministries and stakeholders are responsible for relevant parts such as agriculture, rural development, forestry, water management, drought monitoring, education and science. In 2002, the Croatian Government established the 14-member National Committee to Combat Desertification with participation of relevant ministries, academia, NGOs and the private sector, and entrusted it with elaborating a draft national action programme to mitigate the effects of drought and combat land degradation. Even though the programme was prepared, it has never been adopted because of a lack of political will. UNCCD implementation has focused on drought preparedness and reducing drought impacts, partly linked with the implementation of UNFCCC. In 2006, the first UNCCD National Report on Implementation was published. Since then no national UNCCD reporting has been carried out

Climate change

Croatia has been an Annex I Party to UNFCCC and Annex B Party to the Kyoto Protocol since in 2007. The overall responsibility for the implementation of UNFCCC falls on the Ministry of Environmental and Nature Protection with the CEA being responsible, inter alia, for data collection and reporting (national emissions inventories). The ministry is responsible for setting strategies, coordinating and supervising

implementation, and providing technical assistance. Other sectoral ministries are responsible for their relevant parts of the “climate agenda” identified in national policy documents, such as transport, agriculture and the economy. So far, Croatia has submitted five national communication reports, the latest in 2010. The National Inventory of Greenhouse Gas Emissions Reports, covering the period 1990-2011, was submitted in May 2013.

The First National Communication was submitted in 2001. Given that after the submission of Croatia’s First National Communication, most parties had already submitted their second and third communications and were preparing a fourth, Croatia was instructed to prepare a consolidated version in order to comply with the time frame set by Decision 4/CP.8. This consolidated version covering the second, third and fourth National Communications was prepared using 1996-2003 data and submitted in 2007. In 2010 Croatia prepared and submitted its Fifth National Communication to the UNFCCC Secretariat.

The key documents for implementing the Convention’s obligations are the 2008 National Strategy and Action Plan for the Implementation of UNFCCC and the Kyoto Protocol. Both were an integral part of the Air Quality Protection and Improvement Plan for Croatia 2008-2011. The plan also tackles issues and provides measures in the sectors of agriculture, energy, forestry, industry, transport and waste. The overarching issue of climate change has also been tackled in various documents of a strategic nature (i.e. the Sustainable Development Strategy, the Energy Development Strategy and the Strategic Framework of Development 2006-2013) and naturally, within the process of legislative harmonization with the EU *acquis*.

Croatia set up a robust legal framework within which it implemented measures to comply with its Kyoto Protocol commitment to keep emissions between 2008 and 2012 at 95 per cent of the level of total emissions in 1990.

After reporting emissions of only 0.9 per cent less than the 2008 base year, compared to the required 5 per cent, Croatia managed to significantly reduce its emissions in subsequent years, partly due to the economic recession, and partly thanks to implementing emission reduction measures. In 2007, Croatia started charging stationary sources emitting more than 30 tons of CO₂/year a tax of 2 – 2.5 €/t CO₂ eq. However, on 1 January 2013, this obligation was cancelled for all stationary sources to be included in ETS system (chapter 5).

In the energy sector, which is responsible for most GHG emissions, Croatia is aiming at a 20 per cent share of renewable energy sources in the overall energy mix in 2020. It also plans to achieve the target of 400 GWh/year of energy produced from cogeneration, reduce fossil fuel consumption through using biodegradable municipal waste, improve energy efficiency in the building and household-appliances sector and introduce biofuels. However, although emission reduction targets and potentials have been established for the energy sector, similar goals are not available for industrial processes, agriculture or waste management.

Ozone layer

Croatia ratified the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer in 1991, as well as all amendments to the Protocol. It belongs to a group of 147 countries with low consumption of ozone-depleting substances (ODS) and thus was granted longer periods for their phase-out. In 2006 Croatia completely phased out the consumption of chlorofluorocarbons (CFCs), halons, carbon-tetrachloride, methyl-chloroform and methyl-bromide.

Regarding the consumption of hydrochlorofluorocarbons (HCFCs), significant reduction has been achieved since 2005, when the ban on imports of products using these substances was applied. In accordance with the HCFC Phase-out Management Plan, the plan was to reach complete “virgin” HCFCs phase-out by 2014, but due to EU accession Croatia banned the use of “virgin” HCFCs in 1 July 2013.

Centres for collection, recovery and recycling of the above-mentioned ODS and alternative substances have been established in Dugopolje, Zagreb and Rijeka. Regarding disposal of halons from firefighting systems and appliances, a halon bank has been established in Varaždin. Annually, the system has a collection rate of 10 tons of ODS. However, the replacement of installations containing HCFCs poses a technical and financial challenge to the Ministry of Environmental and Nature Protection as the substances are present in complex systems in the servicing sector, food industry and hospitals.

Persistent organic pollutants

Croatia ratified the Stockholm Convention on Persistent Organic Pollutants in 2006. It submitted its first National Implementation Report in 2008. In 2008, Croatia adopted the National Plan for the

implementation of the Stockholm Convention. The main coordinating body for the Stockholm Convention is the Ministry of Environmental and Nature Protection, which is specifically responsible for the management of devices and liquids containing PCBs, including hazardous waste contaminated by PCBs and emission control. It cooperates closely with the Ministry of Agriculture (POPs pesticide licences, use requirements, registration), the Ministry of Health and its National Institute for Health (POPs licences and permits) and the Ministry of Economy and the State Inspectorate.

Chemical compounds in general fall under the 2013 Chemical Act, which regulates the management, production, distribution and use of chemicals in Croatia. In 2008 the National Chemicals Safety Strategy was adopted. Regarding POPs pesticides, Croatia expects to fulfil the provision of the Stockholm Convention as the country does not produce, import or use POPs pesticides. According to the National Implementation Report, no Stockholm Convention POPs compounds have been detected in water, and POPs concentrations in the air are below international limits.

The use of PCBs and PCB-containing equipment has not been banned in Croatia. However, their use is permitted only in closed systems. PCBs have never been produced as such, although Croatia has imported liquids containing PCBs for use in equipment. In 2008, the Ordinance on PCBs and PCTs management was adopted. Croatia plans to introduce a systematic monitoring of POPs pesticides in the environment in order to reduce the possibility of transboundary pollution from abroad. While expert knowledge on POPs is satisfactory, awareness among public is low. Also, financial constraints limit the capacities and equipment of laboratories for physical and chemical analysis.

Prior informed consent procedure for hazardous chemicals and pesticides

Croatia ratified the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in 2007. It entered into force on 14 February 2008. The designated national authority for the Rotterdam Convention is the Ministry of Health, which acts in accordance with the Chemical Act. Croatia has been consistent in not allowing imports of hazardous chemicals into the country – the 14 import responses in 2010 were all negative, based on bans of relevant chemicals contained in national legislation. As the Member of the EU, Croatia is part of the central EU system in which import responses

fall under the competence of the European Commission.

Transboundary movements of hazardous waste

Croatia is party to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal. In 2005, Croatia adopted the Waste Management Strategy and in 2007 the Waste Management Plan for the period 2007-2015.

In Croatia, imports of hazardous waste are generally prohibited. They are permitted only when material recovery is used to create a new product or raw material that ceases to be waste after recovery. So far, only one such case has been reported in Croatia. The new Act on Sustainable Waste Management prohibits the import of hazardous waste, mixed municipal waste and leftovers from the incineration of mixed municipal waste for disposal. As there are no landfills or incinerators of hazardous waste in Croatia, transit and export for final disposal and recovery is permitted providing it is performed by a person registered to carry out such activity, coupled with approval by the Ministry of Environmental and Nature Protection.

Croatia has regularly reported on the state of the transboundary movement of hazardous waste. Latest available data for 2009 show an average of 150 permits issued for exports and a total of 42,444 tons of hazardous waste generated and 17,510 tons exported.

4.4 Regional and subregional multilateral environmental agreements

Access to information, public participation and access to justice

Croatia ratified the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters in 2007. Croatia has not yet accepted the GMO amendment to the Convention. The responsible authority for the implementation of the Aarhus Convention is the Ministry of Environmental and Nature Protection. Croatia has so far submitted two national implementation reports (2009 and 2012). Croatia ratified the Protocol on Pollutant Release and Transfer Registers (PRTR) in 2008.

In line with the obligations of the PRTR Protocol, Croatia established the national registry and portal on environmental pollution available on the CEA website. Croatia has adopted a number of laws and

regulations that implement the Aarhus Convention (most importantly the EPA, the Right of Access to Information Act, and the Regulation on Information and Participation of the Public and the Public Concerned in Environmental Matters).

The first pillar of the Aarhus Convention concerning access to information is the best implemented, however problems still persist. CEA is in charge of coordinating and maintaining the Environmental Information System, which contains several databases.

Regarding public participation in decision-making, Croatia has made some progress in recent years. However, problems persist, especially in terms of public participation concerning plans, programmes and policies on the environment, and NGOs still consider the implementation of this pillar insufficient. In this sense, the Association for Nature, Environment and Sustainable Development “Sunce” submitted a communication in January 2012 alleging Croatia’s non-compliance concerning public participation in the adoption of waste management plans at subnational level. The Aarhus Convention Compliance Committee is currently examining the case. Also, according to several civil society representatives, timely access to information is a problem in Croatia, especially with regard to draft legislation. This hinders public participation in the decision-making processes, as the information provided is no longer relevant.

Implementation also lags behind the adopted legislation, especially with regard to vertical cooperation, as most problems seem to exist at subnational level. Insufficient communication between the main authority, the Ministry of Environmental and Nature Protection, and self-governments is one of the main reasons for unsatisfactory practice at regional level. The Ministry of Environmental and Nature Protection has carried out several capacity-building activities, resulting in the publication of guidelines and public participation in EIA and SEA procedures, and guidelines for implementing the code of practice on consultation with the interested public in procedures to adopt laws, other regulations and acts.

On access to the justice pillar, experience shows that there are still gaps in implementing the respective provisions of the Aarhus Convention. The main problems include the length of concrete legal cases and the issue of applying injunctive relief and defining standing, even though the situation has improved since the 2012 Administrative Disputes Act that, inter alia, allows NGOs to request that courts

apply an injunctive directly. Previous practice, as manifested by the Cvjetni Trg (2008-2011) case, meant that the public concerned had to request the application of injunctive relief from the institution being sued.

Industrial accidents

Croatia ratified the Convention on the Transboundary Effects of Industrial Accidents (Industrial Accidents Convention) in 2000. The main authority for the area of transboundary effects of industrial accidents is the Ministry of Environmental and Nature Protection together with the National Protection and Rescue Directorate. Apart from the EPA, which provides the basis for obligations, exemptions, approvals of safety reports, notifications on safety measures, implementation and prevention, Croatia has adopted related legal instruments such as the 2008 Regulation on the Prevention of Major Accidents involving Dangerous Substances and the 2008 Regulation on the Manner of Establishing Environmental Damage.

Croatia takes part in the Convention’s Assistance Programme to build national capacities to address challenges in the area of transboundary industrial accidents and their effects. Croatia participates in the Working Group on Implementation as well as the International Alert System through 112 emergency centres, of which the main centre is located in Zagreb. One of the most pressing issues is inadequate capacity in preparing safety reports in major industrial installations. Under the Industrial Accidents Convention, several case-study training courses have been organized with the aim of strengthening capacities in safety reporting, especially regarding methodology. Cooperation at subregional level, especially with Serbia and the former Yugoslav Republic of Macedonia, has focused on the development of safety reports.

Environmental impact assessment

Since the ratification of the Espoo Convention on Environmental Impact Assessment in a Transboundary Context, three national reports on the implementation thereof have been submitted (2003, 2005 and 2009). The main body responsible for the implementation of the Espoo Convention is the Ministry of Environmental and Nature Protection, which has published guidelines on public participation in EIA and SEA processes (June 2011). From 2008 to 2011, Croatia was a member of the Implementation Committee of the Espoo Convention. Croatia has implemented the main obligations of the Espoo Convention through the EPA and specifically through the 2008 Regulation on the Procedure for

Establishing Integrated Environmental Requirements and the 2009 Regulation on Environmental Impact Assessment (EIA). The latter specifies the criteria for the decision on transboundary EIA and includes three lists of projects to be subjected to the transboundary EIA procedure.

From 2006-2009, three projects with transboundary impact were carried out. Croatia acted as the proponent and followed all the necessary EIA procedures. No major problems with implementation were identified during the transboundary procedure.

Croatia ratified the Protocol on Strategic Environmental Assessment (SEA) to the Espoo Convention in 2009. The main authority responsible for implementing the SEA Protocol is the Ministry of Environmental and Nature Protection. However, lack of practical experience remains an issue both at national and subnational levels, where practical experience of SEA procedures is low or non-existent (chapter 1).

Regarding transboundary SEAs and thus the implementation of SEA Protocol, Croatia has been involved in one such SEA as a party of origin, namely the river basin management plan of Croatia (2007-2013). In addition, it has been involved as the affected party in five transboundary SEAs, namely the National physical plan for the Mokrice hydroelectric power plant (Slovenia, completed in March 2013) and the river basin management plan of Slovenia 2009-2015 (Slovenia, completed in January 2013), the National Energy Programme of Slovenia 2010-2030 (Slovenia, completed in October 2012), the National physical plan for hydroelectric power plant Brežice (Slovenia, completed in March 2012) and the Repository for low- and intermediate-level radioactive waste Vrbina in Krško Municipality (Slovenia, completed in May 2010).

Transboundary air pollution

Croatia has been party to the Convention on Long-range Transboundary Air Pollution (CLRTAP) since 1992. Between 2007 and 2008 Croatia achieved one of its four main long-term objectives in terms of cooperation within the LRTAP Convention, namely the ratification of the CLRTAP protocols on Heavy Metals and Persistent Organic Pollutants in 2007, concerning the Control of Emissions of Volatile Organic Compounds (VOC) or their Transboundary Flows and concerning the Control of Emissions of Nitrogen Oxides (NO_x) or their Transboundary Flows in 2008, and to Abate Acidification, Eutrophication and Ground-level Ozone in 2009.

The implementation of the CLRTAP is under the authority of the Ministry of Environmental and Nature Protection, with support from various national agencies (e.g. the Croatian Environment Agency). The Air Quality Protection and Improvement Plan for 2008-2011 includes criteria for identifying objectives and priorities, assessing air quality, and objectives and policies related thereto. It also defines intersectoral policies, priority measures and the implementation schedule. The measures envisaged in the Plan were developed according to the LRTAP findings.

Several sectoral emission reduction plans and programmes have also been adopted. In 2008, Croatia adopted the Plan on reduction of emissions of SO₂, NO_x and PM_x from large combustion plants and gas turbines (OG 151/08) based on the information provided by these plants on their mandatory emission reduction programmes for air emissions of pollutants. In addition to this and stemming from close overlaps with the energy sector, Croatia set strategic goals for air pollution reduction at national level in the 2009 Strategy for Energy Development. Emission ceilings for pollutants that cause eutrophication, acidification and ground-level ozone formation have been set in the Regulation on emission quotas for certain pollutants in the air (OG 141/08) and the new Regulation adopted in 2013 (OG 108/13). Emission projections and proposals for new emission quotas were included in the Programme for gradual emission reduction of certain pollutants in Croatia for the period until the end of 2010, with emission projections for 2010-2020 (OG 152/09) adopted according to the ratified protocols and Regulation on emission quotas for certain pollutants in the air (OG 141/08).

Regarding SO₂ emissions, Croatia complies with the national target of maintaining SO₂ emissions below 1990 levels. Emissions in 2011 were around 78 per cent lower than in the base year 1990, thanks to greater consumption of fossil fuels with lower sulphur content and greater consumption of natural gas. The reduction of SO₂ emissions was achieved in almost all sectors thanks to the installation of two sulphur recovery plants at refineries, the first in 1997 and the second in 2008.

Regarding NO_x emissions, Croatia complies with the national target of maintaining NO_x emissions at the 1990 level. The biggest source of NO_x is road transport, although thanks to catalytic convertors its contribution has decreased considerably since 1999. Stationary large combustion sources (LCS) remain among the top sources of NO_x emissions (emissions levels for LCS were set in the relevant plan in 2008).

Photo 4.1: A ferry line on Adriatic Sea, Split

Regarding POPs, Croatia has provided annual emissions reports for three groups of POPs, namely pesticides (agricultural use), polycyclic aromatic hydrocarbons (PAH) (residential combustion, coke and aluminium production) and dioxins/furans (fuel wood residential combustion). For all three categories, emission ceilings have been set and complied with, even though pace is rather slow.

The situation for heavy metals has improved considerably since 1999, largely due to the phase-out of leaded petrol in vehicles (estimated at 9.2 t per year). Similar developments have been identified for mercury and cadmium emissions.

Ammonia emissions have decreased, mostly due to emissions reduction in NPK fertilizer production in the “other chemical industry” sector following the implementation of measures to reduce ammonia emissions (waste gas treatment devices - scrubbers). Ammonia emissions in 2011 were still above the value set by the Gothenburg Protocol (30 Gg), although a declining trend is visible. The reason for nonconformity is the recalculation of emissions in 2003, which led to increased ammonia emissions for a whole time series. The recalculated value of ammonia emissions in 1990 amounted to 57 Gg, which is 47 per cent more than the value set in the Gothenburg Protocol.

NMVOC emissions mainly relate to the use of solvents, road transport, refineries and the combustion of wood in households. Road transport releases the most emissions in the transport sector, but road transport has also shown the greatest reduction in NMVOC emissions due to new exhaust emission requirements. Environmental requirements for reducing NMVOC emissions from products containing solvents have also contributed to lower NMVOC emissions. The decreasing trend in NMVOC emissions from 2007 onwards is partly a result of the implementation of best available techniques (BAT) in the solvent sector and for other products, partly due to the decreased production of solvent products, and partly because of the drop in population in Croatia. Croatia is fulfilling its obligation towards NMVOC emissions.

PM₁₀ emissions mainly result from small-scale combustion, followed by industrial processes and transport. For PM_{2.5} emissions, the “small combustion” sub-sector is the main source, and contributed to total nation PM_{2.5} emissions in 2011 of 49.5 per cent, while transport, in second place, contributed 21.3 per cent of total PM_{2.5} emissions. In comparison to 1990, PM_{2.5} emissions decreased by 22.9 per cent as a result of consuming fossil fuels with lower ash content in the stationary energy sector, and lower numbers of animals in the manure management sector.

Transboundary waters

Croatia is involved in several bilateral and multilateral activities that aim to promote sustainable management of shared watercourses. Transboundary cooperation has a long tradition, resulting from the need to protect transboundary water sources and shared history. Croatia is party to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, the Convention on the Protection and Sustainable Use of the Danube River, and the Framework Agreement on the Sava River Basin District. The main authority on water management is the Ministry of Agriculture; however, the responsibilities are shared with other ministries, i.e. the Ministry of Environmental and Nature Protection and the Ministry of Health.

The backbone of the bilateral cooperation on water management is still bilateral agreements with Hungary, Bosnia and Herzegovina, Slovenia and Montenegro. A central point of cooperation is the management of transboundary watercourses, including common projects on integrated water resource management, such as flood protection, and the elaboration of river basin management plans (RBMP). Regular meetings within relevant interstate water commissions and various common, internationally funded projects on transboundary cooperation are at the heart of transboundary cooperation in the region (box 4.1). While there is no similar agreement with Serbia (currently under preparation), cooperation between the two countries is satisfactory, especially on flood protection on the Danube River.

Coastline and marine environment management

The main instrument for cooperating on coastline and marine environment management is the Barcelona Convention on the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its amendments, along with the amendments of the Dumping Protocol ratified by Croatia. The focal point is the Ministry of Environmental and Nature Protection. Croatia is also party to the Specially Protected Areas and Biodiversity Protocol and the Prevention and Emergency Protocol. In 2006, Croatia ratified the amendments to the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities (LBS) and in 2012 the Protocol on Integrated Coastal Zone Management (ICZM). The Offshore Protocol and the Hazardous Waste Protocol have not been ratified yet.

Concerning the Prevention and Emergency Protocol, in 2008 Croatia adopted the National Contingency Plan for Accidental Marine Pollution, which was elaborated in line with the relevant Subregional Contingency Plan signed by Croatia, Italy and Slovenia in 2005. In 2008, the Agreement on the Subregional Contingency Plan for Prevention and Preparedness for and Response to Major Marine Pollution Incidents in Adriatic Sea was ratified. Concerning activities related to the recently ratified ICZM Protocol, since 2012 Croatia has been jointly preparing a national ICZM strategy with its Marine Strategy, thus also implementing the Ecosystem Approach (ECAP Mediterranean) in one strategic document (Marine and Coastal Management Strategy).

As part of a GEF MedPartnership Project, an impact analysis of the ICZM Protocol on the national legal framework was conducted. In the framework of the same Project, an Economic and Social Analysis of the Use and Cost of Degradation of Marine Environment and Coastal area is being prepared, as well as the activities of the Project on Integration of Climatic Variability and Change into National Strategies to Implement ICZM Protocol in the Mediterranean. The results of both will be incorporated into the Marine and Coastal Management Strategy.

Croatia is involved in the activities of the Joint Commission for the Protection of the Adriatic Sea and its Coastal Areas concluded between the former Yugoslavia and Italy. Croatia's involvement in the multidisciplinary activities of the Commission is coordinated by the Ministry of Environmental and Nature Protection. In 2005, in the framework of the Commission's activities, all three countries signed the Agreement on the Sub-regional Contingency Plan for Prevention and Preparedness for and Response to Major Marine Pollution Incidents in Adriatic Sea. Its aim is to serve as a platform, with assistance from the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea and the UNEP Mediterranean Action Plan (MAP), for cooperation in cases where accidents exceed the available response capacity of each individual country.

The technical work of the Joint Commission is done through sub-commissions, which are created according to needs and agreement among countries. Currently, active sub-commissions are dealing with the implementation of the Marine Strategy Framework Directive, ICZM and sustainable development, ballast water management and contingency plan.

Box 4.1: Neretva and Trebišnjica Management Project

The Neretva and Trebišnjica Management Project on transboundary cooperation between Bosnia and Herzegovina and Croatia started in 2009. The project covers the basins of the Neretva River, which is the longest river in the Adriatic catchment area and the most water-rich tributary of the Adriatic Sea, and Trebišnjica River, both highly affected by the construction of seven hydropower facilities up to 1984.

The objectives are manifold and cover areas such as transboundary water resource management (capacity building, development of river basin management plans (RBMP)), management and use of wetlands ecosystems and biodiversity (pilot to mitigate salt water intrusion in the delta, management of ecological subsystems – the Bačina Lakes), water pollution control (improved industrial wastewater treatment in the metallurgy plant in Konjic) and public participation.

Based on cooperation in the joint Interstate Water Commission (ISWC), Bosnia and Herzegovina and Croatia established a coordination committee for implementing the Project. In order to involve as many experts as possible, a technical advisory group was established that comprised experts from Bosnia and Herzegovina, and Croatia from the water, environment, agriculture and energy sectors as well as representatives from municipalities and NGOs.

The project has so far resulted in strengthened interstate cooperation in the area of integrated water resources management with available RBMPs, which are certain to be replicated elsewhere in the region. The project's achievements in reducing the stress on environment include a reduction in saltwater intrusion, improved ecosystem health and biodiversity in the basin, and less water pollution from municipal and industrial sources. As a follow-up, a technical working group was formed comprising four experts from Bosnia and Herzegovina and Croatia.

Source: www.gef.org

In 2000, Croatia signed the Ancona Declaration that established the Adriatic-Ionian Initiative, which aims at, inter alia, protecting the environment in the area. The main cooperative body is the Adriatic-Ionian Council at ministerial level, with a focus on annual meetings and round-tables on specific topics, the most relevant being the roundtable for environmental protection and protection against fire.

Some of Croatia's internationally funded subregional projects in the area of water and coastal protection have simultaneously aimed at strengthening the biodiversity of the river basins concerned. From 2007-2009, a LIFE project "The Protection of Biodiversity of the Sava River Basin Floodplains" was aimed at supporting preparations for drawing up the Integrated River Basin Management Plan and building capacities for the implementation of the Birds and Habitats Directives. In Croatia, one plan is in place for the entire country, despite the existence of two major river basins, which are tackled separately in annexes to the plan.

4.5 International technical assistance on the environment

Since the start of the pre-accession process in 2005, Croatia has hugely benefited from the various EU programmes and projects focused on transposing the EU *acquis* into Croatian legislation. The most important programme since 2007 has been the Instrument for Pre-accession Assistance (IPA) that followed up on the Community Assistance to Reconstruction, Development and Stabilization

(CARDS), which ended in 2005. Complemented by the Programme of Community Aid to the countries of Central and Eastern Europe (PHARE) and the Instrument for Structural Policies for Pre-accession (ISPA), IPA has been the main channel of funds allocated to the environment in Croatia.

Croatia's cooperation with the Global Environmental Fund (GEF) has so far included 30 projects, 14 on national level and 16 on regional level. Altogether, Croatia has received grants totalling US\$43,293,700 and US\$76,171,816 respectively (leveraging US\$299,767,950 and US\$590,118,985 in co-financing). The majority of national projects have centred on biodiversity and climate change. At regional level, the projects have mostly focused on international waters (13 out of 16).

In 2012, the co-funded GEF-UNDP projects "National Biodiversity Planning to Support the Implementation of the CBD 2011-2020 Strategic Plan" and "Strengthening the Institutional and Financial Sustainability of the National Protected Area Systems" were approved. The overarching aim is to integrate and mainstream Croatia's CBD obligations into national development and sectoral planning frameworks, in line with the global guidance contained in the CBD Strategic Plan.

In its cooperation with UNEP, Croatia has focused mainly on the issues of sustainable consumption and production (SCP) and implementation of the Barcelona Convention. UNDP, in close cooperation with GEF, has focused on identifying issues that

prevent the spread of energy-efficient technologies in the residential and service sectors (2005/7-2013) and on the conservation of biodiversity on the Dalmatian Coast (2005-13).

4.6 Sustainable development and millennium development goals

Sustainable development

In February 2009, Croatia adopted the National Strategy on Sustainable Development (NSDS). The NSDS centres on eight overarching issues, for which it sets basic objectives and identifies key challenges. In developing such a strategy, Croatia fulfilled the requirements of the UN Commission on Sustainable Development (CSD). Croatia submitted national reports for the CSD 16-17 (2008) and CSD 18-19 (2010), which were coordinated by the Ministry of Environmental and Nature Protection. Croatia was actively involved in preparing the 2012 UN Conference on Sustainable Development, namely as a Member of the Bureau of the Preparatory Committee of the Rio+20 Conference. Croatia also prepared a national submission to the Rio+20 Conference.

Millennium Development Goals

Croatia prepared its first Millennium Development Goal (MDG) implementation report in August 2004 with participation from all relevant Government institutions, academia and NGOs. Following this, in 2006 Croatia submitted a Progress Report on the Achievement of the National MDGs for the period since 2004. In 2010, Croatia submitted its second national report on MDG implementation (“Overview of achievements of the Republic of Croatia in the fulfilment of Millennium Development Goals during the period from 2006 to 2010”). The coordinating body was the Ministry of Foreign Affairs and European Integration.

Concerning MDG-7 (“Ensure Environmental Sustainability”), the 2010 report tackled 3 out of the 31 national targets defined, namely the “Integrate sustainable development principles into national policy and programmes and reverse the loss of environmental resources”, “Reduce the proportion of people without adequate water supply and drainage” and “Improve waste management and reduce waste in the Republic of Croatia”.

While all the above-mentioned targets are of great relevance to Croatia, the focus was selective and insufficient. Although it is understandable that Croatia put greater emphasis on the EU-related

strategic documents that basically guided the 2010 report, the link between the implementation of NSDS and MDGs is still weak. There is a lack of a coherent set of indicators in order to better track progress in achieving MDGs.

Considering specific targets and achievements, there is a positive trend in the process of achieving the MDG-7 (“Ensure Environmental Sustainability”):

- Target 7.1: The proportion of land area covered by forest increased from 33.7 per cent in 2000 to 34.3 per cent in 2010;
- Target 7.2: Carbon dioxide emissions figures vary slightly depending on the sources, but overall fluctuations are detectable in both cases with a spike in 2005-2008 and a drop in 2009 and 2010 following the financial and economic crisis;
- Target 7.3: The consumption of all ODS substances radically decreased with CFCs dropping from 141.5 tons in 1999 to zero in 2011;
- Target 7.6: The proportion of protected terrestrial and marine areas as a percentage of the total territory significantly increased from 6.88 per cent in 1999 to 9.55 per cent in 2010.
- Targets 7.8 and 7.9: The water usage and sanitation situation has remained at a high level since 1999.

4.7 Conclusions and recommendations

Since 2005, Croatia has taken a broad range of measures to ensure participation in and implementation of the majority of MEAs. The ratification process of the most important MEAs has significantly benefited from the transposition of *acquis communautaire* into national legislation. Thus, in legislation terms, implementation of the vast majority of MEAs is almost complete. However, challenges still remain in their practical implementation, mainly on subnational level, which is subject to a lack of awareness and knowledge of the various implementing instruments.

The Ministry of Environmental and Nature Protection is the main governmental institution, with responsibilities to implement the country’s international environmental obligations. However, in its efforts to implement these responsibilities, the Ministry needs to cooperate with other key stakeholders. So far, the level of cooperation between the Ministry and other State authorities is unsatisfactory, thus contributing to the ad-hoc implementation of MEA obligation.

Recommendation 4.1

The Government should ensure that:

- (a) MEA-related administrative capacities are strengthened;*
- (b) Coordinating bodies are in place in order to facilitate the implementation of MEA activities;*
- (c) Cooperation with other State authorities and stakeholders is improved on a regular basis.*

Croatia has followed its obligations stemming from the UNFCCC and Kyoto Protocol, especially in the energy sector, which features specific national targets and potentials for reduction. However, in other areas, such as industry, agriculture and waste management, no country-specific targets have been established.

Recommendation 4.2

The Ministry of Environmental and Nature Protection should further focus on establishing national emission-reduction goals in the area of industrial processes, agriculture and waste management.

***PART II: MOBILIZING FINANCIAL RESOURCES FOR
ENVIRONMENT AND SUSTAINABLE DEVELOPMENT***

Chapter 5

ECONOMIC INSTRUMENTS AND FINANCING OF ENVIRONMENTAL PROTECTION EXPENDITURE

5.1 Introduction

Before the global financial crisis that started in 2008, Croatia's economy grew by between four and six per cent annually from 2000 to 2007. In 2008 the country experienced an abrupt economic slowdown that it has not yet recovered from, although there was a brief respite in 2010. Croatia went back into recession in 2012. The crisis increased poverty from 10 per cent in 2008 to 14 per cent in 2012. Unemployment rose to reach over 14 per cent at the end of 2012. Croatia's economy will face pressure in the medium term as a result of the continuing global financial crisis and the country's dependence on the economic cycles of the European Union (EU).

In 2012, Croatia's tourist sector represented around 15 per cent of the country's GDP. The agriculture sector accounted for just 4 per cent of GDP and employed 14 per cent of the labour force. Almost 42 per cent of the country's population lives in rural areas. About half of Croatia's trade is with the euro area, which is also the source of about three quarters of foreign direct investments in the country.

5.2 Economic instruments

Pollution charges

Air pollution charges

Air pollution charges in Croatia commenced in 1999 and currently exist for emissions of carbon dioxide (CO₂), sulphur dioxide (SO₂) and nitric oxides in the form of nitric dioxide (NO₂). This is in line with several Western European countries, e.g. Sweden, Denmark, Norway, and Italy, where air pollution charges are limited to SO₂ and/or NO_x. Approximately 1,200 polluters are obliged to pay pollution charges that are collected by the Environmental Protection and Energy Efficiency Fund (EPEEF). The levels of charges are as follows:

- CO₂: 14 HRK/t;
- SO₂: 310 HRK/t;
- NO₂: 310 HRK/t.

These pollution charges are uniform across the country, i.e. there are no specific regional coefficients to take into account regional or local environmental conditions. Pollution charges have not been increased since 2008. Unit charges are not adjusted to inflation. These facts raise the question of the charges' effectiveness as instruments to improve the environmental performance of economic agents operating in the country.

Water effluent charges

The "water protection fee" is a water pollution fee paid by entities that discharge wastewater, or manufacture or import mineral fertilizers and place them on the market. The water protection tariff is calculated by Croatian Waters. Charges on the quantity of mineral fertilizers manufactured or imported into Croatia are calculated on a straightforward basis set at HRK 1 per ton of mineral fertilizers. The base for calculating the water protection charge for wastewater discharge is more complex and depends on the quantity and quality of discharged water. Specifically, the basic fee is calculated according to the total amount of wastewater discharged as determined by measurement or expert analysis and assessment. For households and businesses, the amount of wastewater discharged is calculated on the basis of the quantity of water supplied. For households that use water from their own wells or pumps, a base volume of 40 m³ of water per household per year is imputed. The base tariffs are:

- 1.35 HRK/m³ of discharged wastewater since 1 January 2013 (previously 0.90 HRK);
- 0.00135 HRK/m³ of cooling water discharged in 2013 (previously 0.0009 HRK).

All entities pay this basic tariff based on the volume of discharge. The resulting amount of compensation is multiplied by a coefficient (*kI*) of water pollution in cases of entities that discharge technologically contaminated water or water with modified properties (e.g. differences in temperature.). The correction coefficient *kI* expresses the composition of the wastewater through indicators of water pollution and

the presence of hazardous and other pollutants in wastewater. Its calculation is based on specific water rights permits or regulations governing the emission limit values for wastewater. The charge for entities whose wastewater is treated prior to discharge is reduced by coefficient k_2 . It is set at:

- 0.70 for activities where wastewater is discharged via the first stage of water treatment;
- 0.30 for activities where wastewater is discharged via the second stage of wastewater treatment;
- 0.20 for activities where wastewater is discharged via the third stage of treatment and that have found solutions for sludge treatment and disposal.

A third coefficient k_f is applied in cases of wastewater discharges in quantities greater than 30 m³ per day that take place in the exercise of economic activity. The fixed k_f coefficient is 1.2.

Waste-related charges

Municipal and industrial waste

The parties subject to paying these annual charges are owners/users of permitted disposal sites for municipal and non-hazardous industrial waste. The charge is calculated and paid according to the weight of waste disposed. The charge for hazardous waste is calculated according to the weight of generated and untreated non-exported hazardous waste and the characteristics of such waste.

Packaging waste

Charges for packaging waste are paid to EPEEF by producers or importers to cover the costs of collection, recovery and disposal of packaging waste and are:

- A disposal charge paid by type of material and weight of product in order to cover disposal costs;
- A return charge for single-use beverage packaging;
- An incentive charge paid only by producers who do not employ multi-use, returnable packaging in their production line to pack beverages for the purpose of promoting recycling; paid until the targets are reached.

The fee structure for the disposal charge is as follows:

- PET: 410 HRK/t;
- Aluminium cans: 410 HRK/t;
- Iron cans: 225 HRK/t;
- Paper, cardboard: 375 HRK/t;
- Multi-layered packaging with dominant paper cardboard component
 - For beverages: 410 HRK/t;
 - For other purposes: 750 HRK/t.
- Plastic bags: 1,500 HRK/t;
- Wood: 150 HRK/t;
- Textile: 150 HRK/t;
- Other polymer materials: 750 HRK/t;
- Glass: 150 HRK/t.

Waste tyres

The charge for waste tyres is paid to EPEEF by producers and importers of tyres to cover the costs of disposal and recovery. Specifically:

- Imported and manufactured tyres are charged at a rate of 1,500.00 HRK/t;
- Tyres that are an integral part of imported vehicles and aircraft are charged as follows:
 - For passenger cars, a rate of 10 HRK/tyre;
 - For professional vehicles up to 3.5 t and tractors, a rate of 15 HRK/tyre;
 - For trucks, buses and forklift trucks, a rate of 85 HRK/tyre;
 - For construction work machines, a rate of 250 HRK/tyre;
 - For aeroplanes and other aircraft, a rate of 250 HRK/tyre.

EPEEF pays compensation to authorized recovery operators and collectors. Compensation for authorized recovery operators is set as follows:

- For recycling waste tyres, a rate of 750 HRK/t;
- For energy purposes, a rate of 120 HRK/t of waste tyres.

Authorized collectors are entitled to the following fees paid by EPEEF for the amount of waste tyres collected:

- 350 HRK/t for the amount of tyres received from waste tyre holders;
- 70 HRK/t for temporary storage, sorting and loading prior to transportation for recovery;
- 1 HRK/t/km for transportation from their facilities to the authorized recovery operator.

Photo 5.1: Splitska bank office, Split

Charge for end-of-life vehicles

Charges for end-of-life vehicles are paid to EPEEF by producers or importers when placing vehicles on the market to cover the costs of disposal and recovery of waste vehicles. The unit charge for waste vehicles amounts to 0.85 HRK/kg.

EPEEF compensation for the costs of collecting and recovering end-of-life vehicles has been set at 1.65 HRK/kg.

Charge for waste electrical and electronic equipment

A charge for managing waste electrical and electronic equipment is paid by producers and importers placing relevant products on the market to cover the costs of separate collection, treatment and recovery of this type of waste. The unit charge collected by EPEEF is 2.25 HRK/kg. The maximum weight for compensation purposes is set at 500 kg.

Compensation from EPEEF to collection operators is set at 2.60 HRK/kg of EE waste (VAT included) submitted to the waste treatment operators. EPEEF compensation to treatment operators has been set at 1.40 HRK/kg for category one EE waste (large household appliances) and 0.60 HRK/kg for the other categories.

Waste batteries and accumulators

Charges for waste batteries and accumulators are paid to EPEEF by importers and/or producers for batteries/accumulators placed on the market to cover the cost of collection, treatment and recycling of waste batteries and accumulators, including the cost of raising public awareness on battery recycling. Compensation is paid per amount of imported and manufactured batteries and accumulators as follows:

- Starters at a rate of 0.45 HRK/kg (since 2009);
- Portable batteries and accumulators at a rate of 8.40 HRK/kg;
- Industrial batteries and accumulators at a rate of 0.70 HRK/kg.

The fee paid by EPEEF to authorized collectors of waste batteries and accumulators amounts to:

- 12 HRK/kg of portable waste batteries received from the holder;
- 0.50 HRK/kg of waste starters received from the holder;
- 0.50 HRK/kg of industrial waste batteries and accumulators received.

The fee paid by EPEEF to recovery operators for the treatment and/or recycling of waste batteries and accumulators amounts to:

- 100 HRK/t for treatment and/or recycling of waste starters and industrial waste batteries and accumulators;
- 7.50 HRK/kg for treatment and/or recycling of waste portable batteries and accumulators.

Waste oils

Fees for the disposal of lubricating oil waste are paid by both producers and importers of lubricating oils to EPEEF when these products are placed on the market, to cover the costs of disposal and recycling. The compensation fee paid to authorized collectors of oils is 1 HRK/l. Authorized facilities for recovery and/or disposal must not charge a fee for receiving waste oils from authorized collectors.

Transport-related taxes

Tax on passenger cars, other motor vehicles, vessels and aircraft

Prior to July 2013, a national tax on the purchase of new cars was in place. Taxable persons/entities were importers and domestic manufacturers of motor vehicles, vessels and aircraft. For domestic sales, the taxable base was the sales price, excluding VAT. For imports, it was the customs base plus the amount of the customs duty. From an environmental point of view, this choice of a tax base did not constitute optimum practice, since new technologies that reduce the impact on the environment often increase the price of a vehicle (e.g. hybrid cars).

Since July 2013, the Act on Special Tax on Motor Vehicles (NN 15/13, 108/13) has regulated the payment of excise tax on motor vehicles intended for use on roads in Croatia. The special tax is a revenue of the State budget.

Special tax on motor vehicles is paid as a percentage of the tax base according to the price of the vehicle (table 5.1) and the percentage of the tax base on the basis of the price of the vehicle according to average emissions of carbon dioxide (CO₂), expressed in grams per kilometre (table 5.2) depending on the type of fuel used for vehicle traffic, by adding together these amounts.

Motor vehicles running on diesel fuel with average carbon dioxide (CO₂) emissions of up to 85 grams per kilometre, and motor vehicles running on gasoline, liquefied petroleum gas or natural gas with average carbon dioxide (CO₂) emissions of up to 90 grams per kilometre, do not pay the special tax on emissions of carbon dioxide (CO₂).

Table 5.1: Share of special tax on the basis of vehicle price

Price of the vehicle in HKRs			Tax base per cent
0.00	up to	100,000.00	1.0
100,000.01	up to	150,000.00	2.0
150,000.01	up to	200,000.00	4.0
200,000.01	up to	250,000.00	6.0
250,000.01	up to	300,000.00	7.0
300,000.01	up to	350,000.00	8.0
350,000.01	up to	400,000.00	9.0
400,000.01	up to	450,000.00	11.0
450,000.01	up to	500,000.00	12.0
	over	500,000.01	14.0

Source: Act on Special Tax on Motor Vehicles (NN 15/13, 108/13), 2013.

Special environmental charge for motor vehicles

The special environmental charge is paid at the time of registration for all motor vehicles, i.e. at the point when the vehicle is certified to be roadworthy. The special charge is calculated and paid according to the type of vehicle (passenger car or motorcycle), type of engine and motor fuel, power rating of the engine, and age of the vehicle. This is the second most important source of revenue for EPEEF (table 5.11).

County tax on road motor vehicles

This is a county-level tax applying to any person or legal entity that owns a registered passenger car (up to 10 years old) or a motorcycle. Vehicles over 10 years old are not subject to this tax. The revenue from this tax is not used for environmental purposes. The tax increases with the power of the engine expressed in kW, which is obviously positive for the environment. The tax decreases with the age of the car and stops after 10 years in line with table 5.3. This tax structure in effect penalizes newer technologies and vehicles that are generally less detrimental to the environment. The relevant regulation on road taxes is the Act on Financing of Units of Local and Regional Self-Government (OG 117/93, 33/00, 73/00, 59/01, 107/01, 117/01 - correction, 150/02, 147/03, 132/06, 73/08, 25/12).

County tax on vessels

This is a county-level tax applying to legal entities and natural persons that own vessels. The amount of tax depends on the length expressed in metres, the age of the vessel, whether it has a cabin or not, and the power of the engine expressed in kW. The rates are presented in table 5.4.

Table 5.2: Part of the special tax on the basis of average emissions of carbon dioxide (CO₂)

Diesel fuel				Gasoline, LNG, natural gas, and diesel fuel with gas emission EURO VI			
Emission CO ₂ (g/km)			% tax on the price of a vehicle	Emission CO ₂ (g/km)			% tax on the price of a vehicle
86	up to	100	1.5	91	up to	100	1.0
101	up to	110	2.5	101	up to	110	2.0
111	up to	120	3.5	111	up to	120	3.0
121	up to	130	7.0	121	up to	130	6.0
131	up to	140	11.5	131	up to	140	10.0
141	up to	160	16.0	141	up to	160	14.0
161	up to	180	18.0	161	up to	180	16.0
181	up to	200	20.0	181	up to	200	18.0
201	up to	225	23.0	201	up to	225	21.0
226	up to	250	27.0	226	up to	250	23.0
251	up to	300	29.0	251	up to	300	27.0
301	up to		31.0	301	up to		29.0

Source: Act on Special Tax on Motor Vehicles (NN 15/13, 108/13), 2013.

Table 5.3: Passenger car and motorcycle road tax

Power of the engine in kW	Up to 2 years old	From 2 to 5 years old	From 5 to 10 years old	Over 10 years old
	HRK paid			
Passenger car				
under 55	300	250	200	..
55 to 70	400	350	250	..
70 to 100	600	500	400	..
100 to 130	900	700	600	..
over 130	1,500	1,200	1,000	..
Motorcycle				
under 20	100	80	50	..
20 to 50	200	150	100	50
50 to 80	500	400	300	200
over 80	1,200	1,000	800	600

Source: Ministry of Finance – Tax Administration, http://www.porezna-uprava.hr/en/EN_porezni_sustav/Stranice/THE-CROATIAN-TAX-SYSTEM.aspx accessed 20 June 2013.

Table 5.4: Tax on vessels

Length in metres	Vessel without a cabin			Vessel with a cabin, motor powered				Vessel with cabin and powered by sails			
	Engine power (kW)			Engine power (kW)				Engine power (kW)			
	Up to 30	30 to 100	Over 100	Up to 30	30 to 100	100 to 500	Over 500	Up to 10	10 to 25	25 to 50	Over 50
5 to 7	..	200	400	..	200	300	..	..	300	400	500
7 to 10	100	300	500	200	400	500	2,500	200	600	1,000	2,000
10 to 12	200	450	600	300	500	1,000	3,500	300	800	2,000	3,000
over 12	..	..	..	400	1,000	3,000	5,000	400	1,500	3,000	4,000

Source: Ministry of Finance – Tax Administration, http://www.porezna-uprava.hr/en/EN_porezni_sustav/Stranice/THE-CROATIAN-TAX-SYSTEM.aspx accessed 20 June 2013.

The relevant legal basis is the Act on Financing of Units of Local and Regional Self-Government (OG 117/93, 33/00, 73/00, 59/01, 107/01, 117/01 - correction, 150/02, 147/03, 132/06, 73/08, 25/12).

Excise duties levied on fuel products

Professional gas oil end-users in agriculture, fishery and aquaculture are exempted from paying excise duties on gas oil. A detailed presentation of excise duties can be found in table 5.5. As shown in the rate structure, leaded petrol is still registered in the list of excise duties, even though its phase-out started in 2006 in Croatia. An almost seven-fold difference exists between the tax rate for diesel intended for transport and that intended for heating: HRK 2,050 per 1,000 litres and HRK 300 per 1,000 litres respectively.

The resulting price difference might certainly encourage the illegal use of the lower-priced heating fuel for transport purposes. The relevant regulations are:

- Excise Duties Act (OG 83/09, 111/12);
- Ordinance on the Excise Duties (OG 1/10);
- Ordinance on the Application of the Excise Taxes on Blue Painted Gas Oil for the Purposes of Agriculture, Fisheries and Aquaculture (OG 1/10, 44/10, 65/10 – correction, 78/10, 131/10, 144/10, 4/11, 44/11, 134/11);
- Directive of the Government on the Amount of Excise Duty for LPG – Liquid Petroleum Gas (OG 4/10);
- Directive of the Government on the Amount of Excise Duty on Cigarettes (OG 102/10);
- Directive of the Government on the Excise Duties on Petrol used as a Motor Fuel and Gas Oil (OG 28/11).

Utility prices

Electricity prices

The average electricity selling price (excluding VAT) for 2011 according to Eurostat categories is shown in table 5.6. Domestic prices picked up during the first half of 2009 and dropped considerably afterwards. Prices for industry did not decline. The current structure of prices for both households and industry is inversely related to consumption, as seen in table 5.6. For example in 2011, tariffs per kWh for low consumption in households (< 1,000 kWh) and

industry (< 20 MWh) were almost double those for high consumption in households (< 15,000 kWh) and more than double for high consumption in industry (> 150,000 MWh). This price structure does not offer incentives for innovation and investment in energy efficiency and energy saving.

Petroleum and natural gas prices

Retail prices for petroleum products (table 5.7) and natural gas (table 5.8) increased across the board in the years up to 2011. The most impressive increases were seen in the selling price of natural gas in the services sector (where prices almost tripled between 2000 and 2011).

Water prices

According to available data for 2005, the average price of water was HRK 7.89 (€2.10)/m³ for households and HRK 13.64 (€1.88)/m³ for industries. The prices ranged from HRK 3.50 (€0.48) to HRK 17.51 (€2.41)/m³ for households and from HRK 3.50 (€0.48) to HRK 24.47 (€3.37)/m³ for industries. The considerable differences in water prices between municipal operators are to a large extent the result of the different work scopes of various operators and the spectrum of water services they provide and charge to users. The price of water for industries is on average almost twice that paid by households.

Around 65 per cent of funds collected from water charges is aimed at recovering the costs of performing activities at the level of municipal operators (operation, routine maintenance and infrastructure management), while the rest is directed at special-purpose funds to finance water management and construct water structures for public water supply and waste water sewerage, or for the State budget. The average price of water in 2009 amounted to HRK 10.54 (€1.45)/m³ for households and HRK 19.39 (€2.67)/m³ for industry (the price includes the costs of water supply, sewerage, VAT, all legal fees, development fees, etc.). In comparison with 2005, the price of water increased by 33 per cent for households and 42 per cent for industry.

The total increase related mostly to the components of the price of water, which is the revenue of a public provider of water utility services. In 2009, the lowest drinking water price from public water supply systems for households amounted to HRK 3.50 (€0.48)/m³, and the highest price amounted to HRK 20.15 (€2.77)/m³.

Table 5.5: Excise duties on fuel

Excise product	Excise duty
Petrol used as a motor fuel:	
Leaded petrol	HRK 3,600/1,000 l
Unleaded petrol	HRK 2,500/1,000 l
Gas oil falling within CN codes 2710 19 41 to 2710 19 49	
for motor fuels	HRK 2,500/1,000 l
for heating	HRK 300/1,000 l
Kerosene – petroleum falling within CN codes 2710 19 21 and 2710 19 25	
for motor fuels	HRK 2,200/1,000 l
for heating	HRK 1,752/1,000 l
Liquid petroleum gas falling within CN codes 2711 12 11 to 2711 19 00	
for motor fuels	HRK 100/1,000 kg
for heating	HRK 100/1,000 kg
Heavy fuel oil	HRK 110/1,000 kg
Biofuels-pure	0 HRK

Source: Ministry of Finance – Tax Administration.

Table 5.6: Average electricity selling prices (VAT excluded), HRK/kWh

Category	2007		2008		2009		2010		2011	
	1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12
Households										
< 1,000 kWh	0.90	1.09	1.16	1.23	1.26	1.10	1.12	1.09	1.10	1.17
1,000 -2,500 kWh	0.74	0.64	0.64	0.76	0.76	0.67	0.67	0.67	0.67	0.75
2,500 – 5,000 kWh	0.56	0.58	0.58	0.69	0.69	0.68	0.68	0.68	0.68	0.70
5,000 – 15,000 kWh	0.54	0.55	0.54	0.65	0.65	0.66	0.65	0.66	0.66	0.66
> 15,000 kWh	0.40	0.52	0.52	0.62	0.62	0.63	0.63	0.63	0.63	0.64
Industry										
< 20 MWh	0.53	0.68	0.69	0.81	0.81	0.84	0.85	0.85	0.85	0.85
20 - 500 MWh	0.59	0.58	0.58	0.72	0.73	0.75	0.77	0.76	0.77	0.76
500 – 2,000 MWh	0.49	0.54	0.55	0.68	0.64	0.66	0.68	0.66	0.67	0.67
2,000 – 20,000 MWh	0.31	0.46	0.45	0.58	0.54	0.57	0.58	0.57	0.57	0.57
20,000 – 70,000 MWh	0.30	0.34	0.39	0.43	0.46	0.45	0.49	0.49	0.45	0.44
70,000 – 150,000 MWh	0.28	0.30	0.30	0.39	0.40	0.41	0.45	0.39	0.43	0.40
> 150,000 MWh	0.28	0.33	0.33	0.42	..	..	..	0.43	..	..

Source: Annual Energy Report “Energy in Croatia”, Ministry of Economy, various years.

Water-related fees

Water use fee

The water use fee that is paid for different commercial water uses related to the kind of water and category of water status is a water abstraction fee. The fee is payable by legal and natural persons that abstract water from a natural reservoir, regardless of the purpose for which the water is used. Uses include industry, energy production, services, agriculture and municipal services.

Part of the revenue from the water use fee is used to invest in constructing new facilities or maintaining existing infrastructure, including treatment plants, water reservoirs and main pipelines.

The charges for surface water abstraction in place from 2013 are:

- HRK 1.35 per m³ of surface water classified as being in “very good condition” when the water abstracted is related to delivery of water services to public providers;
- HRK 0.72 per m³ of surface water classified as being in “good condition”;
- HRK 0.56 per m³ of surface water classified as being in “moderate condition”;
- HRK 0.32 per m³ of surface water classified as being in a “bad and very bad state”.

Table 5.7: Petroleum product retail prices (HRK/l) – annual average

Year	EURO 98 BMB	EURO 95 BMB	DG- EURO	DG- PLAVI	LUEL	UNP A
2000	5.96	-	-	2.76	2.64	-
2001	6.85	-	-	3.01	3.14	-
2002	6.73	-	5.36	2.56	2.71	-
2003	6.66	-	5.44	2.56	2.77	-
2004	7.14	-	6.00	3.08	3.29	-
2005	7.72	-	6.96	4.02	4.17	-
2006	8.24	7.88	7.26	4.21	4.70	-
2007	8.16	7.92	7.40	4.24	4.66	-
2008	8.58	8.48	8.63	5.05	5.83	-
2009	7.38	7.33	6.79	3.68	4.08	3.80
2010	8.45	8.41	7.82	4.64	5.08	4.59
2011	10.00	9.63	9.05	5.48	6.17	4.97

Source: Annual Energy Report “Energy in Croatia”, Ministry of Economy, various years.

Notes: EURO BMB 98 - Unleaded Motor Gasoline

EURO BMB 95 - Unleaded Motor Gasoline

UNP A - Liquefied petroleum gas

DG-EURO - Eurodiesel

DG-PLAVI - Eurodiesel Blue

LUEL - Light Fuel Oil for Households

Table 5.8: Average selling price of natural gas, VAT included

Customer category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Households	1.45	1.72	1.94	1.95	2.04	2.04	2.05	2.05	2.05	2.41	2.83	2.88
Services	1.45	1.72	1.98	1.99	2.08	2.06	2.07	2.07	2.08	2.44	3.43	4.12
Industry	1.38	1.72	1.94	1.94	2.04	2.05	2.05	2.04	2.05	2.43	3.60	3.99

Source: Annual Energy Report “Energy in Croatia”, Ministry of Economy, various years.

The charges for groundwater abstraction since 1 January 2013 are:

- HRK 1.35 per m³ of groundwater classified as being in “good condition” when the water abstracted is related to delivery of water services to public providers;
- HRK 0.32 per m³ of groundwater classified as being in “bad condition”;
- HRK 1.60 per m³ of thermal and mineral groundwater.

Water regulation fee

This fee concerns owners or users of real estate except agricultural land. The basis for calculating the fee is the surface area of the property. Funds obtained are used to finance professional, administrative and other costs of the water system when they have the characteristics of a public service. Areas funded include plans for flood control and ice protection, plans to protect against erosion, regular technical and economic maintenance of watercourses, regulation

and protection of buildings, and the maintenance and management of drainage and irrigation systems.

Water contribution fee

The water contribution fee is paid by constructors, including the State, based on the principle that urbanization projects increase the risk of floods and flash floods due to changes in the nature of the landscape and the natural flow of water. Revenue from the water contribution fee is used among other things for constructing and improving drainage infrastructure owned by local governments.

Water development fee

A representative body of the local self-Government unit may decide to apply a water development fee. This body may introduce the development fee when increased investments in water utility facilities are needed for protecting water sources within the sanitary protection zones. The basis for calculating the water development fee is either the volume of the water service provided or the price of the water service. The amount of the development fee per unit of the water service provided or the rate of the price

of the water service are decided by the representative body of the local or regional self-Government.

Subsidies/State aid

In 2011, aid for environmental protection and energy saving amounted to HRK 26.8 million, which is 1.8 per cent less than in 2010, when it amounted to HRK 27.3 million, and 60 per cent less than in 2009, when it amounted to HRK 64.6 million. For instance, in 2011 the Ministry of the Economy, Labour and Entrepreneurship awarded an energy-saving grant of HRK 5.8 million under the aid scheme Promotion of bio-diesel production to the undertakings Biodizel Vukovar d.o.o. from Vukovar and Biotron d.o.o. from Klanjec. EPEEF awarded aid amounting to HRK 5.6 million – HRK 4.1 million in the form of grants and HRK 1.5 million in soft loans.

Emissions trading scheme

Ahead of its accession to the EU, Croatia joined the EU Emissions Trading System (ETS) at the start of Phase III in 2013. For this purpose, the Government selected 73 installations to be covered by the EU scheme in its third phase. Sixty of installations were finally selected, of which 13 small-scale emitters requested to be excluded from EU ETS phase three. Croatian companies will be required to surrender allowances in line with their emissions by April 2014.

In order to prepare the Croatian framework for integration with the system of Greenhouse Gas (GHG) emission trading among EU Member States (Directive 2003/87/EC), in 2008 the Government established a GHG emissions trading system in accordance with the criteria used for the EU trading system, based on the Regulation on Greenhouse Gas Emission Monitoring, Policy and Measures for their Reduction in Croatia (OG 87/12). Since 2009, installations participating in trading system have been obliged to obtain emission permits, and since 2010 they have had to monitor emissions from installations and submit annual verified reports.

5.3 Environmental protection expenditures and their financing

The main national sources of funding for environment-related investments are all private and State-owned business entities (table 5.9), EPEEF (table 5.10) and Croatian Waters. In 2011, the priority areas receiving the majority of investment funding were waste management water supply and wastewater treatment. Although there is no evidence of green procurement practices being followed,

noticeable efforts are being made towards greening the economy, especially on energy efficiency.

Between 2008 and 2010, investments in environmental protection by all business entities declined from HRK 2.3 billion to HRK 2.2 billion, partly reflecting the broader economic crisis. However, in 2011 investments increased substantially and reached HRK 2.8 billion, but decreased in 2012 to HRK 1.21 billion. The majority of investments in 2010 and 2011 went to end-of-pipe investments, mostly in wastewater and waste management. For example, out of a total of HRK 2.8 billion in 2011, about a third went on wastewater management (36.6%) and waste management (30.5%). Expenditure increased during the same four-year period from HRK 1.36 billion in 2008 to almost HRK 1.45 billion in 2010 and HRK 2.29 billion in 2012 (table 5.10). In 2010 and 2011 the biggest expenditures were on wastewater (16.37%) and waste management (64.22%). Expenditure on the protection of ambient air and climate accounted for almost 10 per cent of total expenditures in 2011. In 2005, central Government environmental expenditure was almost half of local Government environmental expenditure, whereas in 2011 the relationship reversed: central governmental expenditure was 50 per cent higher than local Government expenditure.

Expenditure on environmental protection at local Government level increased in nominal terms from HRK 416 million in 2005 to HRK 624 million in 2009 but then declined in 2010 and 2011, reaching HRK 465 million. When adjusted for inflation, the decline is even more severe: expenditure from local Government in 2010 and 2011 dropped in real terms by almost 10 per cent compared to the baseline year of 2005. In fact, environmental expenditure at local Government level was lower in real terms in 2011 than in 2005.

The picture is different when looking at expenditure on environmental protection at central Government level (Figure 5.1). There was an increase between 2005 and 2011. The highest level of expenditure was observed in 2011 when, in real terms, expenditure was almost 2.5 times the level observed in 2005.

It should be added that some fluctuations were observed during the intermediate years, but real expenditure has never dropped back to 2005 levels. Overall, increases in central Government environmental expenditure more than offset declines in local Government spending (table 5.11). The aggregate picture shows a considerable increase between 2005 and 2011.

Table 5.9: Environmental protection expenditures, investments and revenues from private and State-owned businesses, 1,000 HRK

Year	2008	2009	2010	2011	2012
Protection of ambient air and climate					
Total investment	426,323	298,924	374,808	193,318	150,488
Total expenditure	100,888	119,638	81,161	181,671	129,636
Revenues from environmental protection activities	7,561	7,826	1,046,625	308,322	313,841
Wastewater management					
Total investments	608,296	420,390	349,316	1,034,908	507,490
Total expenditure	295,262	387,577	389,417	539,036	374,042
Revenues from environmental protection activities	448,468	488,323	487,605	604,454	498,823
Waste management					
Total investment	228,111	143,006	170,040	861,633	139,467
Total expenditure	584,251	617,698	645,718	790,300	1,467,031
Revenues from environmental protection activities	640,822	465,155	615,302	1,456,041	1,514,437
Protection and remediation of soil, groundwater and surface waters					
Total investment	293,444	60,741	265,280	237,341	164,392
Total expenditure	95,928	123,750	126,806	189,474	121,875
Revenues from environmental protection activities	32,828	26,629	8,378	32,086	34,795
Noise and vibration					
Total investments	17,586	16,922	141,214	43,541	37,484
Total expenditure	2,796	1,239	760	2,470	764
Revenues from environmental protection activities	107	97	..	..	..
Protection of biodiversity and landscape					
Total investment	29,163	15,984	52,495	45,791	34,385
Total expenditure	48,890	48,510	47,781	41,777	19,937
Revenues from environmental protection activities	4,040	4,130	310	3,104	4,821
Protection against radiation					
Total investment	224	142	44,264	42,760	29,319
Total expenditure	4,575	1,851	2,346	2,219	4,734
Revenues from environmental protection activities	..	..	..	..	..
Other environmental protection activities					
Total investment	713,353	1,173,998	834,866	370,039	58,058
Total expenditure	230,706	189,134	153,346	174,388	166,151
Revenues from environmental protection activities	18,847	17,647	16,446	23,881	16,575
Total					
Total investment	2,316,500	2,130,107	2,232,283	2,829,331	1,121,083
Total expenditure	1,363,296	1,489,397	1,447,335	1,921,335	2,284,170
Revenues from environmental protection activities	1,152,673	1,009,807	2,174,666	2,427,888	2,383,292

Source: Statistical yearbook, various years.

Total expenditure (central and local government) in nominal terms stood at HRK 1.1 billion in 2011, almost double its 2005 level, when it was 622 million. Adjusted for inflation, 2011 levels were almost 50 per cent higher than 2005 levels.

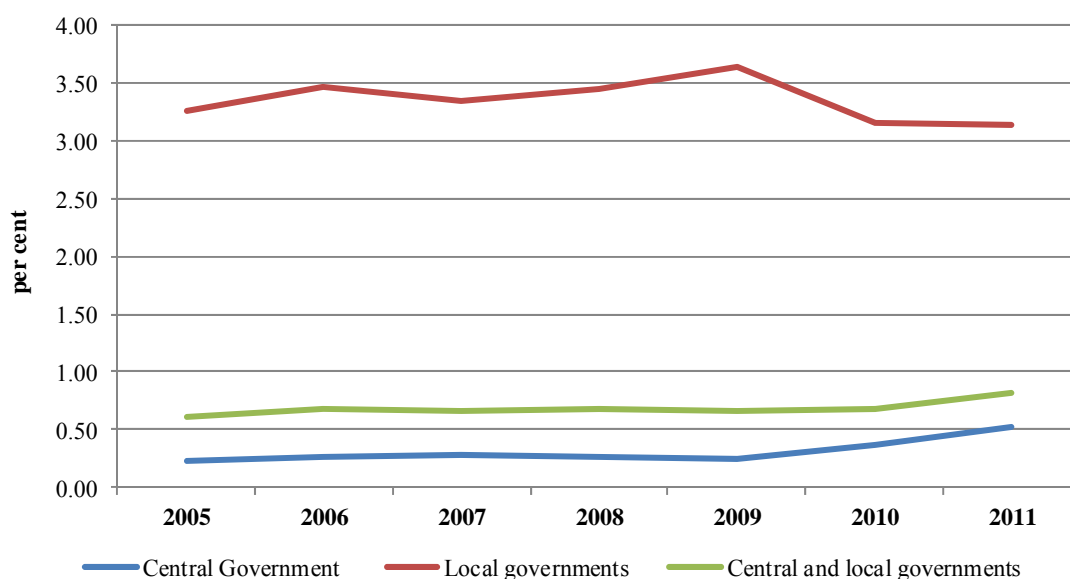
Waste

Major investments related to waste management are concentrated in the construction of waste management centres, landfill remediation and rehabilitation of environmental hotspots polluted by hazardous waste. Between 2006 and 2011, more than 4,000 jobs were created in the waste management system. Implementation of a special waste flow management system is also underway (application of

the 'polluter pays' principle), for which funds are ensured through the Environmental Protection and Energy Efficiency Fund.

Landfill remediation

The remediation and closing of existing municipal disposal sites is financed by EPEEF as part of the Waste Management Strategy in co-operation with local governments and self-Government units. Between 2004 and 2011, EPEEF accepted 299 remediation projects for a total of HRK 2.9 billion (€370 million), for which its financial participation came to HRK 1.6 billion (€213 million), accounting for 55 per cent of the total amount.

Figure 5.1: Percentage of environmental expenditure in total budgets of central and local governments

Source: IMF GFS database. Accessed on 31.10.2013; Statistical Yearbooks.

By the end of 2011, a total of 107 municipal landfills had been remediated and EPEEF had disbursed HRK 553 million (approx. €73 million). Of the total amount of HRK 1.6 billion approved for the period until 2018, HRK 54 million were scheduled to be used by 2012; however it appears that only about HRK 30 million were used (table 5.11). In 2013, an additional HRK 67 million were planned along with the remaining funds for the period until 2018, which is the deadline for completing the remediation and establishment of waste management centres. EU structural funds are further planned for co-financing landfill remediation. For the 2012-2013 programming period, 42 remediation projects are under preparation totalling €155.8 million. The preparation of the indicated projects, i.e. necessary technical and other documentation, is co-financed by EPEEF and local self-Government units for a total of €7 million.

EPEEF has accepted projects for the remediation of dump sites (illegal landfills) at 1,007 locations in 192 local self-Government units, two nature parks and one national park. EPEEF has allocated funds for the remediation of dumps amounting to HRK 103 million (€14 million). By the end of 2011, 750 dumps had been remediated, for which EPEEF had disbursed HRK 65.7 million (€8.7 million). In 2012, preliminary figures showed a drop to HRK 668,000 for this purpose.

Waste management centres

ISPA funds were used to establish the Regional Waste Management Centre Bikarac, Stage I, in

Šibenik-Knin County. The total approved value of the project was €8.8 million, including €6 million of ISPA funds, €1.57 million to be provided by the City of Šibenik, and €1.25 million by EPEEF. The main works contract was completed in November 2011.

The ISPA programme was officially closed on 31 December 2011, by which time a total of €7.31 million had been spent (including €4.97 million provided by ISPA funds, €1.3 million by the City of Šibenik, and €1.04 million by EPEEF). The remaining contracts under implementation were completed by mid-2012, and the total amount of €0.51 million was financed by EPEEF (€0.42 million) and the City of Šibenik (€0.09 million).

In December 2012, the EU approved revised project applications for constructing two county waste management centres: Marišćina (Primorje-Gorski Kotar County) and Kaštijun (Istria County). For these two projects, total eligible costs amount to €71.2 million, of which EU funds are €50.6 million, EPEEF funds €3.8 million, and local co-financing €16.7 million. In 2012, EPEEF spent approximately HRK 24 million on the Marišćina waste management centre and approximately HRK 6 million on Kaštijun (table 5.11). The next project in the pipeline for EU structural funds for 2013 is Bikarac (Stage II), which is under preparation.

Within the OP Environmental Protection 2007-2013, a total amount of €73.9 million was allocated for projects in the waste sector.

Table 5.10: EPEEF's actual investment in environmental protection and energy efficiency, 1,000 HRK, 2004-2012

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Environmental protection										
Remediation of municipal waste landfills	27,420	134,903	61,463	57,460	79,176	88,013	54,928	44,474	29,630	577,468
Remediation of illegal landfills	0	8,930	16,013	9,671	16,593	8,362	4,406	2,527	668	67,169
Avoiding and reducing the generation of waste	0	0	14,108	43	1,500	0	6,983	1,834	2,054	26,522
Waste Management	0	1,504	3,694	7,006	5,108	5,206	8,169	72,621	4,688	107,997
Waste management - construction of county waste management centre Kaštijun	0	0	0	0	0	0	0	0	5,914	5,914
Waste management - construction of county waste management centre Mariščina	0	0	0	0	0	0	0	0	23,871	23,871
Waste recovery and exploitation valuable waste properties	418	6,442	3,153	21,775	23,683	20,075	9,579	2,926	3,624	91,675
Remediation of hazardous waste	156	546	12,531	105,696	60,411	112,091	56,622	53,359	69,893	471,305
Former factory workers compensation workers SALONIT Ltd Vranjic	0	0	0	0	0	0	0	0	19,163	19,163
Construction waste - asbestos	0	0	0	0	0	8,280	0	0	0	8,280
Protection, preservation and improvement of the quality of air, soil, water and sea	0	0	50	0	191	4,195	200	0	264	4,900
Promoting cleaner production, avoiding and reducing waste	0	0	16,828	7,720	10,645	16,073	4,081	3,927	1,445	60,717
Protection and preservation of biological and landscape diversity	136	751	2,331	1,531	3,202	3,182	3,035	2,094	1,139	17,401
Promoting sustainable development of rural areas	0	0	0	5,516	2,026	4,904	3,366	1,048	332	17,192
Encouraging educational, research and development studies on environmental protection	0	20	413	6,138	4,150	3,942	3,253	702	1,017	19,636
Other environmental projects	0	20,469	9,309	11,110	28,412	7,960	7,016	8,982	18,462	111,720
Subtotal	28,130	173,564	139,892	233,664	235,098	282,284	161,640	194,493	182,163	1,630,929
Energy efficiency										
Implementation of the National Energy Programme	0	0	12,036	15,733	12,863	31,517	28,726	18,482	31,091	150,449
Implementation of energy audits	0	2,135	83	0	1,171	88	0	0	447	3,924
Promoting the use of renewable energy sources	0	0	2,960	15,261	5,831	8,441	14,780	7,126	13,253	67,652
Promoting sustainable construction	0	0	1,082	1,291	2,663	7,844	15,000	9,602	14,844	52,326
Promoting cleaner transport	0	0	0	0	249	44,798	33,646	3,040	0	81,732
Encouraging educational and information activities on energy efficiency	0	0	979	567	5,540	2,070	318	896	1,398	11,768
Other projects and programs on energy efficiency	0	0	0	3,784	9,982	7,918	24,299	20,441	318	66,742
International cooperation	0	0	0	0	0	0	0	0	14,386	14,386
Encouraging educational and information activities on energy efficiency	0	0	0	0	0	0	0	0	101	101
Subtotal	0	2,135	17,141	36,636	38,298	102,676	116,769	59,587	75,838	449,080
Managing special categories of waste	0	0	592,295	839,749	833,941	595,308	719,180	692,850	691,435	4,964,758
Total	28,130	175,698	749,328	1,110,049	1,107,337	980,269	997,589	946,930	949,436	7,044,767

Source: Environmental Protection and Energy Efficiency Fund, 2013.

For the programming period 2014-2020, in the waste sector, construction of both county and regional waste management centres is planned, in accordance with the National Waste Management Strategy and National Waste Management Plan 2007-2015 aimed at ensuring a more efficient waste management system and fulfilling targets under the Accession Treaty. In 2012 and 2013, HRK 392.77 million (€52.37 million) were allocated for financing the preparation and construction of the Kaštjun, Marišćina and Bikarac waste management centres. For preparatory works for the establishment and construction of nine waste management centres in the territory of Croatia EPEEF funds amounting to HRK 70.4 million were allocated, and funds amounting to HRK 37.4 million were disbursed.

Remediation of hotspots

The remediation of hotspots is co-financed by EPEEF and local self-Government units. From 2004 to 2012, HRK 471 million of funds were disbursed to remediate hotspots and other hazardous waste locations. Under the 2012-2014 EPEEF work plan, HRK 183 million (€24.4 million) have been earmarked to remediate hotspots.

Other waste-related expenditure

In 2011, EPEEF expenditure connected with the implementation of the Waste Act and ordinances on the disposal of special waste categories (packaging, vehicles, tyres, batteries, WEEE, oils) amounted to HRK 693 million. Remediation activities and infrastructure investment are a top priority at this stage for Croatia. Other important activities, for example waste generation reduction, are currently less of a priority. The following activities attracted less than HRK 20 million in 2011:

- Encouragement of waste generation avoidance and reduction;
- Recovery and use of valuable characteristics/components of waste;
- Protection, conservation and improvement of the quality of air, soil, water and sea;
- Promotion of cleaner production, avoidance and reduction of waste generation.

Water and wastewater-related investments

Local self-governments are responsible for financing the construction and maintenance of the water utility infrastructure. The funds collected by Croatian Waters through water fees (water use fee and water

protection fee, table 5.13) are distributed in the form of grants to co-finance the construction of water utility facilities for water supply and wastewater collection and treatment at State level. The development fee is used for co-financing for the same purposes at local level. The ratio of co-financing is established according to municipalities' connection rate and level of development (index).

State budget funds are used as financial aid (grants) to develop water utility infrastructure projects/programmes and infrastructure projects of national significance, and to develop the water utility infrastructure when local self-governments are unable to ensure their share in financing the total costs. Loans from international financial institutions, which are also used for co-financing the construction and development of utility infrastructure facilities and systems, are repaid from the funds of: the development fee and special surcharge on the water tariff, the State budget, the budgets of local and regional self-governments, and water fees (water use fee and water protection fee), in the percentages established in agreements signed on loan repayment.

Total investments in the development of public wastewater collection and treatment systems in 2011 equalled about HRK 938 million. This amount also includes servicing earlier loans used for the stated purposes.

In 2015, investments will commence in public sewerage systems in the Adriatic area through the Coastal Cities Water Pollution Control Project and Inland Waters Project (IBRD loan). The exact status of these investments is not known.

Nature protection

Nature protection activities are financed from: the State budget, self-financing through activities of national and nature parks, international projects, EPEEF, and partly county budgets and other sources.

In the period 2007-2011, funds from the State budget and EPEEF amounted to HRK 65,738,939. For 2012, funds from the State budget and EPEEF were anticipated at HRK 34,245,290. This sum included HRK 24,480,290 from the State budget (of which HRK 18,774,139 is a World Bank loan) and HRK 9,765,000 from EPEEF. However, only HRK 1,139,000 appear to have been actually spent under the EPEEF item "protection and preservation of biodiversity and landscape" (table 5.10).

In the period 2007-2011 EPEEF approved funds in the amount of HRK 16.767 million for co-financing

projects on protection/conservation of biodiversity and landscape. EPEEF has invested in protection of natural values in protected areas (capital investments in national and nature parks), conservation of endangered species (such as White stork, Griffon vulture, Eurasian lynx), remediation of unauthorized waste landfills in protected areas and other ecologically important areas, development of a fire protection system in protected areas, inventory and monitoring, scientific research and education relevant for conservation of biological diversity and fulfilment of international obligations.

During 2011 EPEEF realised a total of almost HRK 2.1 million (39.51 per cent of planned amount for 2011 – HRK 5.3 million) for biodiversity and nature protection projects and a total of HRK 702.061 (18.48 per cent of planned amount for 2011 – HRK 3.8 million) for educational projects closely related to the topics of nature protection and biodiversity.

In its financial plan for 2012 EPEEF has allocated the following:

- A total of HRK 5 million for biodiversity and nature protection projects;
- A total of HRK 4.765 million for educational projects closely related to topics of nature protection and biodiversity.

EPEEF also supports the preparation of technical and all other relevant documentation for EU Projects together with co-financing (EPEEF), and for that purpose, EPEEF has established an expert committee for the evaluation of biodiversity and nature protection project proposals.

Green initiatives

EPEEF is one of the main financial levers promoting green investments in Croatia. According to its annual financial reports to the Parliament, it provided a range of loans, grants and subsidies to stimulate green initiatives. Total disbursements for the purpose amounted to €148.65 million in 2005-2011.

In the period 2004-2010, a total of €3.2 million were disbursed to finance 78 projects in the sustainable building sector. These projects were related to the improvement of energy efficiency of buildings with regard to lighting and heating systems, energy efficient building envelopes and substitution of the primary energy source in boiler plants as well as optimization of combustion systems. €17.66 million were used to finance the implementation of the 2010

National Energy Efficiency Programme for the period 2008-2010.

Within its core activities, EPEEF also supports the organization and financing of a system for the management of specific waste streams. Revenues generated by the fund from charges on users of the environment, importers and producers of packaging waste, waste tyres, vehicles, oil, batteries and accumulators, and electrical and electronic waste and equipment are used to pay the expenses of collection and recycling these waste streams by licensed collectors and recovery operators.

For example, since 2006, EPEEF has financed a system for the separate collection and recycling of packaging waste. Revenue from fees paid by producers/importers for bringing packaging into the market is used by EPEEF to recover/dispose of waste collected through authorized collectors that dispatch PET, aluminium and tin (Al/Fe) cans, and glass packaging to waste packaging management centres. This has led to improvements in waste packaging collection. From 2007 to 2009, 57.4 tons of PET packaging were collected, of which 53.8 were recycled. 152.3 tons of glass packaging and 2.7 tons of Al/Fe packaging were collected, all of which were recycled.

5.4 International level

During the period 2007-2012, Croatia received €910.2 million as an allocation from the Instrument for pre-accession assistance (IPA). For 2013, €94.8 million was allocated. Croatia's main environment programme, the Environmental Operational Programme (EOP) has been financed from IPA Component I – Transition Assistance and Institution Building, Component II – Cross-border Cooperation, and Component IIIb – Regional Development.

EOP has three priorities: waste management infrastructure; improved water supply and integrated wastewater management systems; and technical assistance. The priorities were chosen in accordance with the overall hierarchy of the national strategic document (mainly the Strategic Development Framework 2006-2013, the National Environmental Strategy and various sector strategies). Total expenditure under EOP for 2007-2011 reached €113.8 million, of which €96.7 million were financed by IPA (at a co-financing ratio of 85%) and €17.1 million by Croatia.

The authority responsible for implementing the EOP is the Ministry of Environmental and Nature Protection, which is responsible for managing

environmental IPA projects. At project-level, the Ministry of Environmental and Nature Protection shares responsibility with the Ministry of Agriculture, Croatian Waters and the Environmental Protection and Energy Efficiency Fund.

5.5 Institutional Framework

Environmental Protection and Energy Efficiency Fund

The Environmental Protection and Energy Efficiency Fund (EPEEF) was established in 2004 by the 2003 Act on the Environmental Protection and Energy Efficiency Act (No 01-081-03-2395/2) with the aim of strengthening environmental financing of conservation, sustainable use, protection and improvement of the environment, and financing energy efficiency and renewable energy sources.

EPEEF is an extra-budgetary fund. The operation and structure of EPEEF are defined in the 2003 Act and the 2003 Statute of the Environmental Protection and Energy Efficiency Fund (OG 107/03), which was approved by the Management Board of EPEEF with the consent of the Government. The management structure of EPEEF consists of a Management Board (Board) and a Director, who is appointed by the Board.

The Board consists of a Chairman and 6 members. The members of the Management Board are appointed by the Government and include 2 representatives from the Ministry responsible for environmental and nature protection, 1 representative from the Ministry responsible for energy, 1 representative from the Ministry responsible for finance, 1 representative from the Croatian Parliament, 1 representative from the Croatian Chamber of Economy, and 1 representative expert from the field of environmental protection. The Director manages EPEEF's operations. The Management Board of EPEEF adopts the work programme and financial plan for each fiscal year and EPEEF's long-term work programme.

EPEEF resources are used to finance programmes and projects determined in accordance with the country's strategic and policy documents related to the environment and energy. EPEEF's revenues are generated from pollution charges, waste charges, and special environmental charges on motor vehicles.

For example, based on the fee collection regulations issued by the Government, EPEEF calculates fees and issues an official decision to all polluters (enterprises) on how much they have to pay for

emissions into air. The Croatian Environment Agency reviews the accuracy of enterprises' reporting to the Register of Environmental Pollutants. In 2010, 2011, and 2012 almost HRK 240 million were charged for air emissions, of which a total of about HRK 207 million or 86 per cent was received by EPEEF.

The total income from all types of charges in 2004-2012 is presented in table 5.12.

Croatian Waters

Croatian Waters is institutionally subordinate to the Ministry of Agriculture. For the purpose of water management, Croatian Waters establishes water management departments and water management branch offices. The water management departments are in charge of implementing the Water Management Plan in their respective river basin district by, among other things, communicating and cooperating with local and regional self-governments, users of water and the water estate, payers of water fees, and users of funds provided by Croatian Waters.

The Water Services Council is responsible for ensuring that water service prices are determined in legal conformity. The Council consists of nine members who are experts in water supply and wastewater sewerage, water management, economics, public finance or other fields. The members of the Council are appointed and suspended by the Croatian Parliament upon the proposal of the Government for a term of five years, although they may be suspended before the expiry of the stated period.

According to the Water Management Financing Act (OG 153/09, 90/11 and 56/13), water management is financed by water fees, as follows:

1. Water contribution;
2. Water regulation fee;
3. Water use fee;
4. Water protection fee;
5. Amelioration drainage fee;
6. Irrigation fee;
7. Development fee.

Water fees from items 1 to 4 are the revenue of Croatian Waters. The amelioration drainage fee (5) and irrigation fee (6) feed into the budget of regional self-governments. The development fee (7) is the revenue of the public water service provider.

Table 5.11: Environmental expenditure from central and local governments, million HRK

	2005	2006	2007	2008	2009	2010	2011
Budgetary central government total outlays, cash	89,686	97,859	111,052	118,584	120,191	121,874	121,425
of which:							
Environmental protection	206	262	311	306	289	450	641
Local government total outlays, cash	12,783	14,143	15,809	17,861	17,165	15,687	14,786
of which:							
Environmental protection	416	491	529	615	624	494	465
Central and local governments outlays	102,469	112,002	126,861	136,445	137,356	137,561	136,211
of which:							
Environmental expenditure	622	753	840	921	913	944	1,106

Source: IMF GFS database. Accessed on 31.10.2013; Statistical Yearbooks.

Table 5.12: Collected income of the Environmental Protection and Energy Efficiency Fund, 1,000 HRK

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Charges for emissions of CO ₂	0	0	0	15,598	32,272	113,134	53,463	57,238	65,331	337,037
Charges for emissions of SO ₂	2,372	8,307	9,595	12,396	18,739	16,189	6,223	9,561	2,598	85,979
Charges for emissions of NO ₂	1,142	3,584	6,175	5,804	4,386	6,460	6,043	2,631	3,565	39,791
Charges for non-hazardous technological (industrial) waste	2,486	3,459	6,027	8,862	8,277	1,488	7,086	0	2,756	40,441
Charges for hazardous waste	222	994	2,249	920	24	15	0	0	0	4,425
Special environmental charges for motor vehicles	164,298	196,387	212,117	225,816	214,364	220,715	231,966	228,296	228,738	1,922,698
Subtotal	170,519	212,731	236,164	269,397	278,062	358,002	304,781	297,726	302,988	2,430,370
Charges for packaging and packaging waste	0	27	397,888	627,866	561,939	537,357	483,947	496,749	478,078	3,583,850
Charges for managing waste tyres	0	0	21,125	44,709	42,006	31,736	27,523	28,856	28,973	224,928
Charges for managing waste vehicles	0	0	0	87,979	104,505	56,819	46,506	47,954	39,136	382,899
Charges for managing waste oil	0	0	0	29,563	49,070	42,207	35,920	40,047	41,412	238,220
Charges for managing waste batteries and accumulators	0	0	0	7,862	12,760	10,359	6,664	6,499	7,563	51,708
Charges for managing waste electrical and electronic devices and equipment	0	0	0	32,784	169,504	121,776	123,600	100,209	107,323	655,196
Subtotal	0	27	419,013	830,763	939,785	800,254	724,159	720,314	702,484	5,136,800
Total	170,519	212,758	655,177	1,100,160	1,217,846	1,158,256	1,028,941	1,018,040	1,005,472	7,567,170

Source: Environmental Protection and Energy Efficiency Fund, 2013.

Table 5.13: Sources of revenue of Croatian Waters, 1,000 HRK

Sources of Revenue	2005	2006	2007	2008	2009	2010	2011	2012	2013 (est.)
Water fees									
1. Fee for water use	300,974	284,805	284,754	272,986	270,864	279,312	298,133	284,724	436,000
2. Water protection fee	286,418	271,685	275,619	251,806	220,729	221,503	221,197	218,712	326,000
3. Fee for the extraction of sand and gravel *	22,932	11,222	89,898	..	..	..	..	..	..
4. Water regulation fee	475,067	570,309	650,104	720,034	682,580	672,021	659,977	757,641	690,000
5. Water contributions	..	319,698	576,267	634,567	602,489	414,682	316,448	178,163	160,000
Subtotal	1,085,391	1,457,719	1,876,642	1,879,393	1,776,662	1,587,518	1,495,755	1,439,240	1,612,000
Revenue from state budget	461,148	384,088	631,870	793,616	433,267	467,575	469,386	386,268	581,699
Other revenues	156,856	191,759	179,600	226,616	179,022	103,286	98,640	140,990	140,288
Total	618,004	575,847	811,470	1,020,232	612,289	570,861	568,026	527,258	721,987

Source: Croatian Waters, 2013.

Note: * The fee for the extraction of sand and gravel was repealed in the new Water Act.

The legal basis for the water protection fee is also provided by the Regulation on fees on water protection (OG 82/10 and 83/12); and the Ordinance on the calculation and payment of water protection fees (OG 83/10). Sources of revenues of Croatian Waters in 2005-1013 are presented in Table 5.13.

5.6 Policy framework for strengthening environmental expenditure and investments for greening the economy

The Croatian Strategic documents regarding the environment, nature protection and waste management are the Environmental Protection Strategy, the Environmental Action Plan, the Strategy and Action Plan for the Protection of Biological and Landscape Diversity, the Waste Management Strategy, and the Waste Management Plan for the period 2007-2015. In particular, the Waste Management Strategy regulates the management of different types of waste with the aim of avoiding and reducing waste generation. One of the main principles is to encourage recycling and reuse of waste.

Therefore, based on the Waste Act, which defines the principle of "polluter pays", the Ministry of Environmental and Nature Protection has adopted the following ordinances, which regulate measures and economic instruments used to encourage recycling and reuse of waste for economic purposes:

- Ordinance on packaging and packaging waste;
- Ordinance on the management of waste tyres;
- Ordinance on the management of end-of-life vehicles;
- Ordinance on the management of waste electrical and electronic appliances and equipment;
- Ordinance on the management of waste batteries and accumulators; and
- Ordinance on the management of waste oil.

The Water Management Financing Act, which entered into force on 1 January 2010, regulates the sources of funds for the financing of water management, and in particular water fees, including payment obligation, fee payers, basis for payment, method of calculation, determining the fee rate, spending purposes of such funds, enforcement, statute of limitations, and other issues related to generating and using such funds. The prices of water services are regulated by the Water Act (OG 153/09).

The participation of local and regional self-governments in financing the costs of construction, development, and operation and management of water utility systems is regulated by the Act on Financing of Units of Local and Regional Self-Government (OG 117/93, 33/00, 73/00, 59/01, 107/01, 117/01 - correction, 150/02, 147/03, 132/06, 73/08, 25/12).

5.7 Conclusions and recommendations

Croatia has taken some useful measures in the application of its taxation policy (e.g. electric cars are excluded from special tax on road vehicles) that make a useful move towards green initiatives. The Government has established the Environmental Protection and Energy Efficiency Fund (EPEEF) to provide extrabudgetary sources for financing green initiatives and environmental protection projects. However, the share of green horizontal subsidies in these funds is relatively low.

Recommendation 5.1:

The Government should increase the share of green horizontal subsidies in the extrabudgetary Environmental Protection and Energy Efficiency Fund.

At the time of the EPR review, Croatia's air pollution charges were limited to only CO₂, SO₂ and NO₂. CO₂ charges have ceased for installations included in EU ETS system, in force since 1 January 2013. At the same time, the level of remaining charges has been stable since 2008 in order to reduce the burden on enterprises following the economic and financial crisis. Pollution charges are not adjusted to inflation and do not reflect regional particularities (e.g. air quality levels for SO₂ and NO₂).

Recommendation 5.2:

The Government should review its air pollution charges policy to encourage companies to make environmental improvements, in particular by:

- (a) *Introducing an automatic indexation mechanism for rates;*
- (b) *Adapting charge levels for regional particularities.*

Electricity prices in Croatia decrease progressively as consumption increases for both households and industry. This price structure has the effect of rewarding higher consumption and therefore does little to change the behaviour of economic agents and households. Overall, the price structure discourages energy efficiency innovations and energy savings.

Recommendation 5.3:

The Government should review and adjust the electricity price structure in order to encourage energy saving and energy-efficiency improvements.

Vehicle-related charges in general increase with the horsepower of engines; however they decrease with the age of vehicles (cars and motorcycles). Similarly, sales taxes are based on the value of vehicles with no regard to environmental performance, thus penalizing environmentally friendly vehicles (such as hybrid

vehicles). As a result, some of the currently applicable tax bases weaken demand for less polluting vehicles.

Recommendation 5.4:

The Government should review and adjust the current system of transport-related taxes, in order to encourage transition to less environmentally polluting practices and choices.

***PART III: INTEGRATION OF ENVIRONMENT INTO
ECONOMIC SECTORS AND PROMOTION OF
SUSTAINABLE DEVELOPMENT***

Chapter 6

WASTE MANAGEMENT

6.1 Introduction

Croatia has a clear understanding of waste management requirements and has already made significant progress towards their implementation. The importance of waste management is politically and institutionally fully recognized and the Government has so far secured financing to cover new investments and operating costs.

Waste management at national and local levels is ensured by waste management plans, which are an important tool for achieving the goals defined in the National Waste Management Strategy. Information on waste data are regularly collected and published on the website of the Croatian Environment Agency (CEA) (www.azo.hr).

Waste management centres are crucial to the safe management of municipal solid waste. The implementation of the principle of generator responsibility is supported by packaging waste recovery and puts pressure on industrial waste generators to improve their waste management.

The lack of capacities for safe disposal of hazardous waste has been solved by exporting hazardous waste to countries with facilities for this type of waste. Waste management in Croatia benefits from European Union (EU) funding and guidance defined in legislation and EU waste management policies.

6.2 Current situation

Municipal solid waste

Generation and collection

Information on municipal solid waste (MSW) in Croatia is sufficiently detailed; each of the 21 counties regularly reports waste-related data to CEA. The trend in municipal solid waste generation on national level increased by 4.6 per cent per year on average until 2009. Waste statistics show a nine per cent decrease in municipal solid waste in 2010, which may be due to the economic crisis and more widespread use of weighbridges on disposal sites. Table 6.1 shows the amounts of municipal solid

waste collected, split into Capital area (box 6.1), Adriatic Croatia (coastal counties) and Continental Croatia (remaining inland counties).

An aggregation of data from these regions indicates that per capita generation of municipal solid waste in Croatia is region specific. Based on 2011 data, generation is above average in the Capital area at 460 kg/cap/y, and in the coastal region influenced by tourism at 480 kg/cap/y, although excluding the impact of tourists the average is 420 kg/cap/y. The remaining inland region shows under-average waste generation, at only 223 kg/cap/y.

Comparing these aggregate results with data published for individual counties, the range of waste per capita is much wider: the lowest generation per capita is Međimurje County, at only 163 kg/cap/y and the highest is Lika-Senj County at 574 kg/cap/y. The reason for such a high variation in per capita waste generation at county level could be because the impact of the non-permanent tourist population is not considered in the calculation of this indicator.

The coverage of municipal solid waste collection is increasing and reached 96 per cent of the total population in 2011, compared to 80 per cent in 2000. The country anticipates that by 2025 almost the entire population will be included in the organized collection of a municipal waste system, recycled and treated waste will have grown significantly, and quantities of municipal and biodegradable waste will be much lower.

Table 6.2 shows the composition of municipal solid waste published in the Waste Management Plan reflecting the situation in 2002, and updated information based on the preparation for developing regional waste management centres in 2007. The fact that the content of kitchen and biodegradable waste is higher in towns than the regional average is in line with situation observed in other countries. Waste in coastal regions shows a higher share of packaging than in continental regions, which may be caused by tourism. Variations in data may be due to the time lapse between analyses and the different regional scope.

Photo 6.1: Separate waste collection in park-forest Marjan, Split**Table 6.1: Municipal waste generation by region, tons**

	2005	2006	2007	2008	2009	2010	2011
Capital area	390,451	398,929	446,731	435,838	399,382	388,048	376,029
Adriatic Croatia	437,051	490,778	558,376	591,597	615,490	513,364	457,789
Continental Croatia	584,732	764,398	718,078	760,875	728,339	707,989	677,821
Total	1,412,234	1,654,105	1,723,185	1,788,310	1,745,220	1,609,401	1,511,639

Source: CEA, 2013.

Table 6.2: MSW Composition, percentage

	2002		2007	
	Continental	Coastal	Split	Pula
Kitchen and biowaste	43.1	41.0	44.8	51.5
Paper and cardboard	19.6	20.3	21.5	17.2
Plastics	11.6	12.3	11.3	16.3
Glass	6.6	7.0	4.4	3.6
Textile	7.8	8.2	3.9	3.5
Metals	4.1	4.0	2.5	2.9
Leather and bones	3.0	3.1	1.6	-
Wood	1.3	1.2	1.4	1.0
Rubber	0.9	0.5	0.5	0.8
Hazardous	0.4	0.2	-	1.2
Inert and other	1.5	2.2	8.1	2.2

Source for 2002: Waste Management Plan for the period 2007-2015, 2007.

Source for 2007: D. Kovačić: Recent Achievements in Landfill Technology in Croatia.

Box 6.1: Municipal waste management in Zagreb

Waste in Zagreb is collected by the company Čistoća, a subsidiary of the municipally owned Zagreb Holding. The company serves the capital with collection of mixed municipal waste, separate collection of recyclables and bulky waste, street cleaning and cleanup of illegal dumpsites. The company has about 1,600 employees, operates a fleet of 114 waste collection vehicles, 85 vehicles for street cleaning and several other specialized vehicles.

The City of Zagreb's comprehensive waste management system includes projects for primary recycling and separation of hazardous waste. Paper, glass, PET and metal packaging, batteries and bio waste are collected in about 6,000 bins and skips, and five recycling yards deal with 20 types of household waste.

Zagreb is served by the landfill Prudinec close to Jakuševac, south of the City centre. The landfill is operated by the company ZGOS, a subsidiary of Zagreb Holding, which complies with standard requirements on sanitary landfill operation. In addition to the disposal of mixed municipal waste, the landfill includes a recycling facility for construction waste and a composting facility. To minimize the impact on the surrounding residential areas, the landfill has installed a system to collect landfill gas and has rehabilitated the landfill's slopes with a final covering of grass. There are plans to further develop the facility by introducing a mechanical and biological treatment (MBT) plant or preparing refuse-derived fuel.

Source: Čistoća company Zagreb

The long Croatian coastline with many islands is a popular tourist destination mostly in the summer and this creates a challenging situation to ensure safe and regular collection of waste. Larger islands are developing their own waste management infrastructure based on separate collection and composting. Residual waste will be sent to the mainland after completion of waste management centres. On smaller islands, waste is collected and accumulates in ROLO containers, which are then taken by ferry to the mainland for disposal.

Landfill

Disposal of municipal waste has started moving from traditional local disposal to regional landfills. Regional self-governments are responsible for initiating this change and thus development depends on their activity. Besides large regional landfills, a number of small local disposal sites exist. Operation is inefficient for sites handling less than 5,000 t/y (or about 20 t/day which could be 3-4 trucks per day) and may work out as very costly for the serviced population.

According to 2010 data, 146 disposal sites were in operation in Croatia (table 6.3) and these received 1,858,127 tons of waste. The infrastructure and prevention measures on landfills are mostly inadequate and only a small number of disposal sites monitor at least one environmental component (water, air or soil).

The Ministry of Environmental and Nature Protection is aware that uncontrolled municipal waste disposal sites are a danger to health, can lead to ground water

contamination and have a negative impact on landscape and tourism. The situation began improving thanks to a municipal waste landfill remediation programme financed by the Environmental Protection and Energy Efficiency Fund (EPEEF) initiated in 2004. Under this programme, remediation involves implementing measures aimed at minimizing the impact of a disposal site on the environment. These measures range from modernization and upgrade of the site to comply with legal requirements and continue operating, to site decommissioning including controlling potential sources of future pollution. At the beginning of 2012, 107 official municipal waste disposal sites had been remediated, 48 sites were in the process of remediation and 146 locations were in the preparatory stages of the remediation process.

Table 6.3: Disposal sites by amount of received waste, 2010

Amount received (t/y)	Number
1 – 5,000	79
5,000 – 50,000	60
50,000 and more	7
Total	146

Source: CEA, 2013.

The 2005 Waste Management Strategy identified 3,000 illegal dumpsites in Croatia. The Environmental Protection and Energy Efficiency Fund (EPEEF) assists municipalities in cleaning up 767 selected illegal dumpsites. At the beginning of 2012, 750 dumpsites had been cleaned up and waste from these sites had been transferred to permitted disposal sites.

Table 6.4: Separately collected municipal solid waste, 2011

Waste type	Amount (t)
Bulky waste	80,560
Paper and cardboard	49,144
Metals	31,336
Green waste from parks and gardens	26,905
Glass	15,589
Street sweepings	10,402
Plastics	10,139
Waste Electrical and Electronic Equipment (WEEE)	9,147
Soil and stones	6,247
Waste from markets	4,816
Biowaste from restaurants and catering	2,373
Waste equipment containing halogenated hydrocarbons	1,690
Other	19,705
Total	268,053

Source: CEA, 2013.

Municipal waste recycling and composting

The share of municipal waste diverted from disposal is still low in Croatia. Only about nine per cent of all municipal solid waste was recycled or composted in 2011. Categories of municipal solid waste that are collected separately are shown in table 6.4, but about half of the total amount separated is sent for disposal.

Waste paper is processed in the PAN Paper mill in Zagreb and the Belišće paper mill in Belišće; plastic waste is processed by the companies Brković and Drava International. Rubber waste is handled by a number of companies and is recovered by the companies Gumiimpex-Grp, Našicecement and Holcim. The capacity of these companies to process recyclables is growing and sufficient to satisfy the recycling requirements of not just Croatia, but also a part of Balkan region, where the recycling industry is less developed than in Croatia.

Only about 24,000 tons of compostable municipal waste has been delivered to 7 composting plants. This represents only 1.6 per cent of the waste generated, and Croatia has the potential to increase this amount significantly, although the composting infrastructure is currently inadequate. Composting needs strong support to achieve the targets set in legislation. The EU supports a policy of reducing biodegradable waste disposal, and EU targets are also binding for Croatia. The objective of reducing the biodegradable component of waste sent to landfills is set in the Waste Management Strategy, the Waste Management Plan, and the Ordinance on the methods and conditions for the landfill of waste, categories and operational requirements for waste landfills. Compared to the base year 1997, the share of biodegradable municipal waste deposited in landfills

must be reduced to 75 per cent by 31 December 2013, 50 per cent by 31 December 2016, and 35 per cent by 31 December 2020.

Industrial waste

Manufacturing waste in Croatia is recorded using the EU classification. CEA has been collecting data on industrial waste from companies since 2003. The total amount of manufacturing waste is close to 1.5 million tons per year, while hazardous waste is about 60,000 tons, or less than 5 per cent of total manufacturing waste (table 6.5). Waste from industrial activities is mainly disposed of with municipal waste, used as secondary fuel or exported for treatment abroad.

The largest waste generator in the period 2003-2009 was the inorganic chemical processes sector, mainly oil processing, which was responsible for generating about 16 per cent of manufacturing waste. Other industrial sectors that contribute over 10 per cent of total manufacturing waste are: construction, agriculture and food processing, energy generation, waste management and water management. About 20 per cent of hazardous waste is generated by the oil industry.

In 2010 the biggest share of manufacturing waste was generated by group 19 (waste from waste management facilities, off-site wastewater treatment plants and the preparation of water intended for human consumption, and water for industrial use), followed by group 10 (waste from thermal processes), group 02 (waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing), and group 17 (construction waste).

Table 6.5: Generation of industrial waste, tons

	2005	2006	2007	2008	2009	2010	2011
Total manufacturing waste	1,512,990	1,796,488	2,004,061	1,493,485	1,257,802	1,592,609	1,536,607
of which,							
Hazardous manufacturing waste	35,543	39,878	52,520	66,478	47,855	58,314	63,615

Source: CEA, 2013.

Box 6.2: Management of oil and gas waste in Croatia

The main oil and gas exploration and extraction company in Croatia is INA Group. Its waste management strategy for 2011-2015 is aimed at improving waste inventory, waste reduction and generation using modern technologies, and remediating old waste-related pollution depending on its environmental impact and economic possibilities. INA Group reported generation of 5,000 tons of hazardous waste and 7,000 tons of non-hazardous waste in 2011. A large share of hazardous waste from oil extraction is injected into deep boreholes.

On INA petrol stations, 15.58 tons of packaging containing hazardous substance residues or contaminated by hazardous substances were collected during 2011. Also in 2011, INA added containers for collecting waste batteries and accumulators, and started informing consumers that waste lubricant oils could be delivered to the authorized concessionaire free of charge.

Source: INA Group Sustainability Report 2011

Medical waste

Medical waste comprises infectious, pathological, pharmaceutical and chemical waste. Hospitals, ambulances and other healthcare facilities in Croatia generated 3,633 tons of medical waste in 2010, of which 2,475 tons of hazardous waste and 1,158 tons of non-hazardous waste. The largest share of medical waste (64 per cent, 2,318 tons, in 2010) is potentially infectious waste, which is treated by sterilization/autoclaving after which it is sent to landfill. Certain types of non-hazardous medical waste are also sent to landfill. A total of 296 tons of medical waste have been exported, mostly for incineration in Austria and Germany. Waste is separated by category in healthcare facilities and collected by contracted companies. Collection systems are usually organized at county level.

Special waste streams

Croatia implements EU waste policy aimed at diverting waste from disposal and increasing the recycling rate of selected waste streams. These are known as special waste streams and include packaging waste, end-of-life vehicles, waste batteries and accumulators, waste from electric and electronic equipment (WEEE), waste oils and waste tyres.

Developing the infrastructure for effective treatment of these waste streams requires substantial financing.

Croatia has implemented a system of fees for special wastes based on the principle of producer responsibility, whereby producers or importers of selected goods are required to pay fees for these goods and the funds collected are used to cover the investment and operation costs of recycling facilities through the EPEEF (chapter 5). An overview of progress in the amounts of special waste collected is shown in table 6.6.

Improvements have been made in separately collected quantities and recovered (recycled) quantities, thus reducing the pressure on the environment and allowing more effective use of landfill space. The most significant progress is in waste electrical and electronic systems and end-of-life vehicle systems.

Packaging waste (paper, glass, plastic) is accumulated through separate collection schemes and delivered for processing to the PAN Paper mill in Zagreb, Belišće, Drava International, Unija Nova and Vetropack. Waste oils are used mainly as fuel in brickyards and cement plants. Waste batteries and accumulators are collected by eight authorized companies.

Three companies are authorized to disassemble accumulators. Lead plates from accumulators and waste batteries are exported for processing or disposal.

Table 6.6: Collected amounts of special waste streams, tons

	2006	2007	2008	2009	2010	2011
Packaging waste	198,225	248,144	267,944	248,411	187,631	125,258
End-of-life vehicles	..	6,737	7,887	16,617	22,756	35,104
Waste batteries/accumulators	..	6,484	10,737	7,180	8,290	8,480
WEEE	..	..	5,719	13,522	17,748	17,518
Waste oils - lubricant	..	6,115	7,068	6,784	6,640	6,391
Waste oils - edible	..	1,132	1,606	2,145	1,260	1,196
Waste tyres	15,139	22,265	21,126	20,233	20,028	16,754

Source: CEA, 2013.

Radioactive waste

Radioactive waste in Croatia is generated from research activities, health treatment and industrial use. It is estimated that about 1 m³ of radioactive waste is generated annually. According to the International Atomic Energy Agency (IAEA), this includes about 30 sealed radioactive sources of category 3 and 4, 1,000 smoke detectors, and some low-level radioactive waste generated in the medical sector. In addition, orphan sealed sources are stored in the radioactive waste storage facility operated by the Radiation Protection Department of Ruđer Bošković Institute (2-5 orphan sources are found on average every year). This facility accommodates all radioactive waste that has been generated in the territory of Croatia.

The total available storage capacity is nearly 100 m³. Only one third has been used so far. Based on expert missions organized by IAEA, this storage facility needs a number of improvements, e.g. installation of a new ventilation system, refurbishment of the rooms, improvement of the tightness (sealing) of the building, installation of a drainage system, stabilization of the surrounding soil slopes, monitoring of the possible contamination of the surroundings, modernization of a laboratory for handling radioactive materials, and installation of a modern security system.

Transboundary movement of waste

Transboundary movement of waste is an integral part of the waste management system. It is considered as a rational option that allows safe management of waste for which there is no existing appropriate treatment or disposal capacities within the country. Croatia exports hazardous and non-hazardous waste and also imports non-hazardous waste (table 6.7).

Hazardous waste exported from Croatia to Serbia, Slovenia, and the former Yugoslavia Republic of

Macedonia for recycling includes lead from car batteries and accumulators. Exports to Austria, Germany and Poland included hazardous waste for safe disposal, for example construction waste containing asbestos, waste paints, solvents, varnish and resins, waste railway sleepers and packaging contaminated with hazardous substances.

Three-quarters of non-hazardous waste exported from Croatia in 2011 was scrap metal, followed by waste wood and waste from thermal processes. Some separated waste fractions (glass, plastic, paper) are exported. The majority of exported non-hazardous waste, about 80 per cent, goes to Slovenia, Turkey and Italy.

Imports of non-hazardous waste are only for recycling. They include paper, glass, metallurgic slag and smaller amounts of metals, fly ash and tyres. The majority of imported non-hazardous waste, about 70 per cent, comes from Bosnia and Herzegovina, Serbia and Slovenia.

All exports and imports are monitored by the Ministry of Environmental and Nature Protection, which issues the relevant permits. CEA publishes annual reports on transboundary movements of waste, which include details on amounts of transported waste, origins and destinations, companies involved in transboundary movement and information on final treatment or disposal of waste.

6.3 Environmental pressures from waste

Information on waste management's impact on the environment is limited. Concrete data are not yet available due to the fact that many of the disposal sites in operation have not installed environmental monitoring systems for air and groundwater pollution. However, the risk of groundwater pollution is high, due to the absence of lining systems at older sites and the prevailing karst-type bedrock, which allows free movement of potential pollution.

Table 6.7: Transboundary movement of waste, tons

	2005	2006	2007	2008	2009	2010	2011
Exports of hazardous waste	13,265	16,711	13,742	19,161	17,878	18,937	21,049
Exports of non-hazardous waste	389,077	572,437	501,798	637,317	472,831	603,955	787,654
Imports of non-hazardous waste	472,054	416,664	543,269	482,917	215,820	225,224	304,328

Source: CEA, 2013.

Environmental inspectors make visits to disposal sites, but their work is to verify whether landfills are operating according to permit conditions with a focus on waste disposal techniques rather than the impact on the surrounding environment.

Complaints have been received from the public regarding the Jakuševac landfill in Zagreb, because the site is located close to the capital and residential areas extend towards the disposal site. The site has been the target of a number of environmental impact studies. A comprehensive assessment was done in the “Jakuševac Landfill”, Zagreb BAT Site Inspection Report, prepared under the CARDS 2004 Project “Support for the Further Approximation of Croatian Legislation with the Environmental Acquis” in 2010, after implementation of remediation measures. This assessment concluded that the site complies with all existing emission limit values except for wastewater, which fails to meet the current limits on nitrogen, but plans exist to upgrade the on-site wastewater treatment plant. Additionally, the final closure plan of the landfill is not complete as it includes only post-closure monitoring, and litter control should be better managed.

6.4 Legal framework

Municipal solid waste management in Croatia is being transformed to comply with modern disposal practices and achieve recycling targets set by the EU. This is a challenge for any country, but Croatia has developed strong legal and institutional structures that have introduced a number of measures improving the situation in terms of collection, recovery and disposal of municipal solid waste. However, implementation of these measures is not fully effective yet.

As a response to the EU Directive No. 2008/98/EC on waste, Croatia adopted the Waste Act (OG 178/04) replacing the 1995 Waste Act. The Waste Act defines the basic terms and principles of waste management, lays down provisions which regulate responsibilities and obligations with respect to waste management, defines the costs of waste management according to a “polluter pays” principle, formulates the content of a waste management information

system, sets out the responsibilities of persons generating or managing waste for supplying data to the system, and requires authorities to maintain this system. This act also sets principles for locating, designing and financing facilities for storage, recovery and disposal of waste.

Technical and organizational details needed for implementing these principles are stipulated in the Ordinance on waste management (OG 23/07, 111/07), which deals with waste storage, recovery and disposal; the Ordinance on the methods and conditions for the landfill of waste, categories and operational requirements for waste landfills (OG 117/07, 111/11, 17/13, 62/13); the Ordinance on methods and requirements for thermal treatment of waste (OG 45/07); and the Instruction on the method of calculating the municipal waste management charge (OG 129/11, 137/11).

People living within 500 m from a waste management facility or municipality in which the facility is located are entitled to receive compensation from the facility operator, due to decreased property value. Further details are set in the Regulation on the criteria, procedure and manner of determining compensation to real estate owners and local self-Government units (OG 59/06, 109/12).

The Waste Act also defines principles for waste recovery and disposal and establishes that recovery has a priority over disposal. The obligations and responsibilities of product producers and waste generators include minimizing waste and creating options for consumers to return used products or packaging. The act also introduces licences for the collection, recovery and disposal of waste and stipulates information to be included in a licence.

The paragraphs on the transboundary transport of waste ban the import of hazardous waste, except in cases of recovery when material recovery is used to create a new product or raw material that ceases to be waste after recovery, and stipulate a system of permits for import, transit and export of non-hazardous waste in line with the principles of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

and the EU. Details are given in the Regulation on supervision of transboundary movement of waste (OG 69/06, 17/07, 39/09)

The section on concessions introduces a system of concessions for performing collection, treatment and disposal activities. A concession must state the purpose, area of activity, duration and special requirements and include supporting documentation. Conditions for issuing and cancelling a concession are also defined.

Administrative supervision for implementing the Waste Act is assigned to the Ministry of Environmental and Nature Protection. The Act also defines how to perform an inspection of waste management activities, the rights and responsibilities of inspectors, and the penalties for illegal actions.

The 2005 Regulation No. 50 on the categories, types and classifications of waste defined in waste catalogues and lists of hazardous waste, introduces EU Waste Classification into the Croatian legislative system as the basis of reporting on waste and defines which types of waste should be considered hazardous.

Legislation on special waste includes packaging waste, waste tyres, waste batteries and accumulators, waste oils, end-of-life vehicles and waste electrical and electronic appliances and equipment. It sets collection and recycling targets for these types of waste, defines a system of licences for persons collecting and processing them, and sets reporting requirements.

The principle of generator responsibility is applied to special waste, whereby the generator or importer has to pay a fee per ton of product put on the market. Income from these fees is then used to finance management of the waste. The following legislative norms cover management of special waste:

- Ordinance on packaging and packaging waste (OG 97/05, 115/05, 81/08, 31/09, 156/09, 38/10, 10/11, 81/11, 126/11, 38/13, 86/13), supported by the Decision on conditions for package labelling (OG 155/05, 24/06 and 28/06). This ordinance contains national targets for the share of returnable packaging per product for 2009 to 2013;
- Ordinance on waste tyre management (OG 40/06, 31/09, 156/09, 111/11, 86/13). In 2006 and 2007 decisions on the permissible quantity of waste tyres to be used for energy purposes were issued

as a temporary measure until the conditions for recycling at least 70 per cent of waste tyres were achieved;

- Ordinance on waste battery and accumulator management (OG 133/06, 31/09, 156/09, 45/12, 86/13) sets targets for recycling;
- Ordinance on end-of-life vehicles management (OG 136/06, 31/09, 156/09, 53/12, 86/13, 91/13);
- Ordinance on waste oil management (OG 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13);
- Ordinance on the management of waste electrical and electronic appliances and equipment (OG 74/07, 33/08, 31/09, 156/09, 143/12, 86/13).

Another group of waste legislation centres on waste types that require specific regulation due to their risk to human health or the environment, or due to their quantity or specific use. These specific regulations reflect individual risks and provide detailed guidance on their management. These legislative norms include:

- Ordinance on medical waste management (OG 72/07);
- Ordinance on management of polychlorinated biphenils and polychlorinated terphenils (OG 105/08);
- Ordinance on management of waste from the titanium dioxide industry (OG 70/08);
- Ordinance on the method and procedures for managing waste containing asbestos (OG 42/07) supported by Instruction on handling waste containing asbestos (OG 89/08);
- Ordinance on management of waste from research and mining of mineral raw materials (OG 128/08);
- Ordinance on management of construction waste (OG 38/08);
- Ordinance on management of wastewater treatment sludge when used in agriculture (OG 38/08).

The international movement of waste, regulated by the 1994 Act No. 3 on Ratification of the Basel Convention, was supported by the 2006 Regulation No. 69 on the supervision of transboundary movement of waste (amended in 2007 No. 17 and in 2009 No. 39).

Additionally, other acts include specific requirements regarding waste management. The Act on

Environmental Protection includes uncontrolled events during waste management and disposal and industrial accidents, and defines waste management as measures for preventing waste generation and reducing waste quantities, without using procedures and/or methods which might damage the environment, and measures for preventing the adverse effects of waste on human health and the environment.

It also stipulates that strategic environmental assessment is mandatory for a waste management plan. It requires that companies minimize waste generation and recovery where possible, and that the remaining waste must be disposed without harm to the environment. Additionally, data on waste management are defined as part of the environmental information system.

The Act on Air (OG 130/11) requires operators to record waste used as fuel. The Act on Environmental Protection and Energy Efficiency Fund defines the fee for generation and disposal of waste as one of the fund's sources of income and allows financing of disposal site remediation, prevention and reduction of waste, waste processing and utilization of waste.

The Act on Physical Planning and Building (OG 76/07, 38/09, 55/11, 90/11, 50/12) sets limitations to the location of waste management facilities in protected coastal areas and obliges investors to dispose of construction waste according to the Waste Act. Failing to remove waste from a construction site may result in a commissioning refusal. In addition, building demolition plans must stipulate the disposal method for construction waste.

The Act on Utility Services (OG 26/03) defines the conditions for establishing a company to provide waste collection services. The Maritime Act (OG 181/04) and the Act on Maritime Domain and Ports (OG 158/03 and 141/06) define obligations for managing waste generated on ships and in ports.

The new Act on Sustainable Waste Management was adopted in July 2013 and entered into force on 23 July 2013. Its adoption brings Croatian legislation closer into line with the EU *acquis*. It also rectifies certain ambiguities in order to enhance and further establish a sustainable waste management system. Responsibilities for waste management have been regulated, especially for municipal waste management through local self-governments, in order to reach Accession Treaty targets (i.e. reduce the amount of biodegradable waste going to landfills and the amount of untreated waste landfilled in existing non-compliant landfills).

The new act introduces new definitions on waste management (e.g. by-product), determines basic criteria for when certain waste ceases to be waste, and establishes recycling targets for certain types of waste (paper, plastics, glass) that could be considered as valuable materials. The act introduces an enhanced special waste category management system, which is aligned with EU practices.

It also brings into to force all other measures and provisions necessary for the development and operation of the waste management system in Croatia, such as waste hierarchy, a simpler waste management permit procedure, transboundary movements of waste permitting and control, a registration procedure for dealers, brokers and transporters of waste, waste management plans, waste prevention plans, locations and establishments for waste management, waste management information systems, record keeping, responsibilities of legal and natural persons and local self-governing and governing units, inspectional and administrative supervision and provisions concerning penalties.

The new act also includes provisions regarding waste management in the marine environment and specifically refers to managing waste produced by offshore activities, managing marine litter and regulating dumping activities. The act sets out a large number of regulations to be adopted for its implementation. It foresees concessions only for municipal waste management and biodegradable municipal waste; this decision is made by the local administrative unit.

6.5 Policy and institution framework

Transition periods

Two transition periods were defined for Croatia during EU accession negotiations:

- By 31 December 2018 Croatia has to bring its landfills for waste in compliance with EU requirements;
- By 31 December 2020 Croatia has to reduce the amount of biodegradable waste going into landfills to 35 per cent of the total amount (by weight) of biodegradable municipal waste produced in 1997, with intermediate deadlines of 31 December 2013 and 31 December 2016.

The changes in waste management infrastructure illustrate the enforcement of waste legislation and its positive impact on the waste sector's development.

However, deficiencies persist in the management of industrial waste.

Waste Management Strategy

A long-term vision of waste management targets is well developed in Croatia. A Waste Management Strategy was adopted in 2005 as a constituent part of the National Environmental Strategy. The Strategy defines strategic waste management objectives, quantitative objectives (targets to be achieved) and measures for achieving these objectives.

The key principles of this strategy are based on a waste management hierarchy, which requires reducing waste generation with the support of recycling and safe disposal. Furthermore, it calls for the use of best available technologies based on their cost-effectiveness and environmental acceptability, the introduction of producer responsibility, the “polluter pays” principle, and increased access to information and public awareness in waste management.

The following strategic waste management objectives are emphasized in the Strategy:

- Avoid and reduce waste generation at source, reduce disposed waste, and increase material and energy recovery from waste;
- Develop an infrastructure for an integrated waste management system;
- Reduce waste risks;
- Contribute to higher employment rate;
- Educate administrative officials, experts and the general public.

As stated in the Strategy, these are long-term objectives and reaching them will take considerable time. However, actions taken by the Ministry of Environmental and Nature Protection are moving in the right direction to achieve them.

Quantitative targets related to waste quantities focus on increasing the population covered by the organized collection of municipal waste, the quantity of separately collected and recycled municipal waste and the quantity of treated waste, and reducing the quantity of waste disposed in landfills and the quantity of disposed bio-degradable municipal waste.

Quantitative targets for landfill sites include developing regional centres for waste management and county-level centres for waste management, and decreasing the number of landfills operating without

permits and the percentage of remediated landfills at a rate determined in 2000. These targets have all been achieved except for the reduction of biodegradable waste disposal, as 92 per cent of this waste was disposed of in 2011, instead of the 85 per cent planned for 2010. This shortfall was caused by the lack of biodegradable waste treatment facilities.

Waste Management Plan

Based on the Waste Management Strategy, the Waste Management Plan for 2007-2015 was prepared and approved by the Government in July 2007, and amended in 2010 and 2011. This plan aimed to implement strategic goals by focusing on establishing an integrated waste management system, remediating and closing existing landfills, remediating hot spots, developing waste management centres, with pre-treatment of waste before final disposal or landfill, and computerizing the waste management information system.

In the area of waste generation prevention, the Waste Management Plan aims at the implementation of economic instruments motivating waste generators to reduce waste generation, and the introduction of systematic public education and campaigns to change consumer behaviour. Attention is paid to separate waste collection, with the plan recommending the introduction of special containers to collect recyclables and the development of recycling yards, including criteria for their capacity and location.

Regarding municipal waste, the plan focuses on a decrease in biodegradable waste disposal, recommends best methods for treating individual fractions present in municipal solid waste, and supports the introduction of regional waste management centres in combination with transfer stations.

Also for hazardous waste, the Waste Management Plan proposes a network of hazardous waste centres in which hazardous waste could be safely accumulated, stored, treated and disposed of or prepared for export.

The Waste Management Plan includes the costs of financing landfill rehabilitation and dumpsite closure, hotspot remediation, and the construction of waste management centres and transfer stations. It highlights the importance of resources collected by the EPEEF, the availability of EU funds, and the necessity for domestic co-financing. A model example in the plan anticipates a cost of €350 million to develop the network of waste management centres.

Besides setting deadlines for investment activities, the plan sets out modern waste management principles and techniques and defines general objectives as a step-by-step guide for waste generators to improve their current practices. This type of waste management planning provides for higher flexibility and creativity in its implementation.

The implementation of the Waste Management Plan is in progress. Implementation of the integrated waste management system has started by providing support to the development of the recycling sector. In several counties, smaller dumpsites have been closed and waste has been redirected to larger sites. Hotspots were targeted in the period 2005-2008 and environmental risks related to hotspots are now under control. The development of regional waste management centres is supported by national and EU funds and three centres are at various stages of completion. The quality of information on waste has improved and covers most types of waste generated in Croatia. The progress made indicates that Croatia is on the right track in modernizing its waste management infrastructure. However, additional attention should be given to phasing out small dumpsites, increasing composting and maintaining support to develop regional waste management centres.

Strategy for Radioactive Waste and Spent Nuclear Fuel Management

Croatia adopted the Strategy for Radioactive Waste and Spent Nuclear Fuel Management in July 2009. The Strategy covers highly radioactive waste, medium-level and low-level radioactive waste, sources of ionising radiation that are no longer going to be used, and orphan sources. The strategy also includes an option to dispose of the radioactive waste and spent fuel that was generated during the operating lifetime of the Krško NPP on Croatian territory if it cannot be disposed of in Slovenia or another country.

Croatia has joint responsibility with Slovenia for the decommissioning and waste management liabilities relating to the Krško Nuclear Power Plant. According to a 2003 agreement between the two countries, specific segregated funds were set up in Croatia and Slovenia to cover each country's share of liabilities to ensure availability of adequate resources for implementing a decommissioning and waste management programme.

Implementation of this strategy started only recently when a Government decision established the radioactive waste storage facility operated by the

Radiation Protection Department of Ruđer Bošković Institute as a national repository of low-activity radioactive waste. This caused public opposition and further upgrading has been delayed. Croatia is cooperating with Slovenia on preparing documentation and allocating funds to decommission Krško NPP.

Waste management plans for counties, cities and individual waste generators

The Waste Management Plan for 2007-2015 requires that counties, cities and municipalities prepare waste management plans for a period of eight years. Individual waste generators producing more than 150 tons of non-hazardous waste or 200 kg of hazardous waste must also prepare their own waste management plans.

Odraz⁶ produced a publication in 2007 in electronic format to provide counties and cities with methodological guidance for preparing local waste management plans as a part of the project financed by the ministry. According to data from 30 April 2012, twenty counties had adopted their own waste management plans. Additionally, 36 cities (10 of which are large cities) and 60 municipalities had adopted waste management plans. Eight counties, 20 cities (8 of which are large cities) and 41 municipalities had published reports on the implementation progress of the waste management plan. Only a small number of municipalities have prepared their own plans and feedback on implementation of waste management plans is not satisfactory. CEA will work with the ministry to step up communication with those that have not yet submitted waste management plans.

By 30 April 2012, a total of 2,198 legal entities had prepared a waste management plan. However, the number of waste generators implementing a waste management plan is growing year on year.

Waste management plans are an important tool in countries that are in the process of transforming their waste management systems. Waste management plans support the exchange of information between central authorities, counties, cities and individual waste generators, thus supporting implementation of

⁶ ODRAZ (Croatian abbreviation for Sustainable Community Development) is a non-governmental, non-profit organization gathering professionals from various fields, who designs and applies the sustainable development concept for the benefit of the local community.

appropriate and effective measures for modernizing the waste management system.

Sustainable Development Strategy

The Sustainable Development Strategy prepared by the Ministry of Environmental and Nature Protection in 2009 also sets objectives for waste management in the chapter on Sustainable Consumption and Production.

The overall objective: “Achieve balanced and stable economic growth that should have less impact on further environmental degradation and waste generation than at present. Growth must be followed by a change in unsustainable behaviour patterns in households and in both public and private sectors” should be achieved by integrating cleaner production programmes into production processes, products and services. Other measures include reducing quantities of finally landfilled waste as well as generated hazardous waste in 2010 by approximately 20 per cent in comparison to 2000, breaking the link between waste production and economic growth, achieving significant reduction in quantities of produced waste via initiatives for preventing waste generation, increasing the recycling rate, remediating existing landfills, building waste management centres, and establishing an integrated waste management information system by 2015.

Institutional arrangements

The Ministry of Environmental and Nature Protection is the central waste management administration body and has implementing and regulating offices in the counties. In the waste sector, the ministry is responsible for:

- Preparing new primary legislation and standards and implementing legislation;
- Preparing the Waste Management Strategy and Waste Management Implementation Plan;
- Issuing permits for hazardous waste management and the incineration of waste; and concessions for specific waste category management (used tyres, packaging waste, waste oils etc.);
- Implementing measures in hazardous waste management;
- Inspecting, supervising and enforcing laws and secondary legislation;
- Supervising activities of CEA and EPEEF.

The EPEEF has been operating as an extra-budgetary institution since early 2004, with the purpose of financing environmental protection programmes and projects. The fund collects environmental charges, which include charges on burdening the environment with hazardous and non-hazardous industrial waste. The fund is a key investment facility in the development of Croatia’s waste management infrastructure (chapter 5).

CEA is responsible for providing reliable and comparable waste data and information to decision-makers and the general public and to this end:

- Collects data according to waste legislation;
- Maintains the waste information system;
- Prepares indicators on waste;
- Produces reports on waste and waste management;
- Improves the quality, quantity, availability and comparability of waste data;
- Publishes waste information on the CEA web pages.

The counties and the City of Zagreb are regional self-governments, which are responsible for managing all types of waste generated, treated or disposed of in their areas of responsibility and issuing waste management plans for their jurisdictions, and for gathering and submitting data on waste (cadastre of emissions into the environment), except permits for hazardous waste management and for thermal treatment of non-hazardous waste.

Towns and municipalities are local self-governments that are responsible for managing municipal waste, preparing waste management plans and determining locations for waste management facilities in their areas other than waste management centres, incineration facilities and landfills for hazardous waste (responsibility of the State) and other landfills of waste or cells for asbestos disposal (responsibility of the county).

The Public Utility Services Act stipulates that public utility services, including municipal waste management, can be performed by:

- Public utility companies established by local self-Government units (local self-Government units should own at least 51 per cent of the company);
- Public institutions established by local self-Government units;

- Organizational units of local self-Government units;
- Legal and natural persons on the basis of a concession or contractual agreement.

The State Office for Radiological and Nuclear Safety is the regulatory body in charge of nuclear issues. It is financed from the State budget, and reports directly to the Government. Its responsibilities are set down in the 2010 Act No. 28 on Radiological and Nuclear Safety. Its administrative capacity is not sufficient to implement all of its obligations, including the provisions of the Euratom Treaty, and needs to be strengthened.

EU accession funding has been used to develop the concept of waste management centres. The waste management centres will be the backbone of the new system for waste management. Each centre should include a landfill complying with EU standards, an MBT facility and a composting plant. The first waste management centre to be developed is Bikarac, Šibenik-Knin County, where a modern sanitary landfill was put into operation in 2011, with a recycling facility to follow. Preparatory works have started for the development of the waste management centre in Marišćina, Primorje - Gorski Kotar County, where a construction permit has been issued, and full operation should start in 2014.

The site of the waste management centre in Kaštijun, Istria County has been decided and the contract forecast notice for the supply of equipment was announced in January 2013. In addition, the preparation of documentation to construct three additional waste management centres has been agreed with the EU. After completion, the network will comprise up to 20 waste management centres, serving the whole territory of Croatia with municipal waste recovery, treatment and disposal.

Permitting system

Companies involved in waste management must register and obtain a permit for collection and transport, recovery and/or disposal of waste, or for the management of special categories of waste. State administration offices in the counties issue permits for non-hazardous waste management (other than thermal treatment of non-hazardous waste). Collection companies servicing the population of Croatia are mostly municipally owned and the number of licensed legal and natural persons registered to collect non-hazardous waste totalled 461 in June 2011. This is a high number and indicates that the waste services market is highly fragmented.

The implementation of the permitting system is ongoing and the number of companies with permits is starting to stabilize after several years of growth (table 6.8). On the other hand, the number of registered companies continues to grow due to the inclusion of smaller waste companies in the register. These trends reflect the situation in Croatia's waste management sector. The number of licences issued for collection and disposal of non-hazardous and hazardous waste started to stabilize from 2008/2009 following fast growth in previous years. This indicates that the majority of waste generators and disposal facilities have been identified. The non-hazardous waste management infrastructure is still developing and this is reflected by the growing number of treatment licences. The number of hazardous waste management treatment licences is stable, which indicates that this infrastructure is not developing extensively.

The number of licences issued for waste carriers, holders and exporters is growing, which indicates a development in the service sector for waste generators.

Table 6.8: Trends in waste management permitting, number of companies

	2006	2007	2008	2009	2010	2011	2012
Permit for non-hazardous waste management	245	333	414	525	545	555	576
Collection	228	303	363	451	464	484	493
Treatment	59	98	75	195	197	249	275
Disposal	47	51	79	97	106	107	101
Permit for hazardous waste management	18	49	111	130	134	128	118
Collection	16	39	94	110	115	105	95
Treatment	10	27	34	70	51	59	63
Registration as							
Carrier	19	118	228	348	499	632	863
Holder	26	35	84	127	177	208	294
Exporter	256	348	457	523	586	625	742

Source: CEA, 2013.

6.6 Conclusions and recommendations

Waste management in Croatia is going through a period of transformation. The implementation of the waste management policy has led to positive changes, but several drawbacks need to be addressed in the future. Positive changes include the wide use of waste management plans on regional and local levels, the efficient system of financing investments in the waste recycling infrastructure through the Environmental Protection and Energy Efficiency Fund, the integration of waste exports into the national system of waste management, and the development of systems for regional waste management centres. In addition, hotspots, cleanup and management of hazardous waste accumulated in the past do not constitute a critical issue for the country. The most significant drawback in the current municipal waste management setup is the fragmented collection and disposal system. The plan to redirect waste from more than 146 landfills to 20 waste management centres is challenging. Successful implementation of this plan requires not only initiative from the Government to raise the funds required and organize tendering for works and equipment, but also support from individual cities and municipalities, i.e. their willingness to give up current local collection and landfill practices.

Recommendation 6.1

The Ministry of Environmental and Nature Protection, in cooperation with the Croatian County Association, the Association of Cities and the Association of Municipalities, should assess the socioeconomic impact of the transformation towards regional/county waste management-based collection and disposal sites systems on individual cities and municipalities, and consider devising incentives for the successful implementation of this transformation.

Additionally, the high number of small landfills is not effective and the Government should explore possibilities for phasing them out. Other countries with similar problems have successfully applied

time-limited permits, which expire if a landfill's operating conditions are not met, or have opted to only provide financial support to large landfills.

Recommendation 6.2

The Ministry of Environmental and Nature Protection, in cooperation with the Environmental Protection and Energy Efficiency Fund, should continue implementing options for reducing the number of local landfills.

Information is limited in Croatia on the impact of waste management on the environment. Considering the value of Croatia as a tourist destination and the potentially easy infiltration of pollution through the karst bedrock, increased awareness of the environmental impacts of waste management is needed.

Recommendation 6.3

The Ministry of Environmental and Nature Protection, in cooperation with other relevant ministries, should strengthen controls of groundwater and air pollution caused by landfills, in accordance with the requirements set out in EIA decisions and environmental permits.

Material recovery systems have been implemented in Croatia and they are able to capture about half of waste suitable for material recovery. On the other hand, composting is not widely used and requires expansion to meet targets set in the legislation.

Recommendation 6.4

The Ministry of Environmental and Nature Protection, in cooperation with the Croatian County Association, the Association of Cities and the Association of Municipalities, should prepare a regulatory framework (ordinance) on biodegradable waste, and, in cooperation with the Environmental Protection and Energy Efficiency Fund, should promote development of biodegradable waste management facilities, with the aim to reduce landfilling of biodegradable waste

Chapter 7

SUSTAINABLE MANAGEMENT OF WATER RESOURCES

7.1 Water supply and demand – current situation and trends

Current status of water supply services

The total volume of water abstracted annually over the period from 2005 to 2012 increased from 511 million m³ to almost 570 million m³ per year (table 7.1). On average, about 50 per cent of the water abstracted for the public water supply is groundwater. Since 2005, a 13 per cent increase in abstraction for the water supply reflects the higher connection ratio. Statistical data on water abstraction do not include water abstracted by individual water intake structures, which are currently not recorded.

In the period 2005-2011, water losses amounted on average to about 40 per cent of total abstracted water (table 7.2). In 2012, estimated water losses were around 37 per cent, which is extremely high. Losses in the water network differ from region to region and are the result of poor maintenance, illegal tapping and a leaky distribution system (pipes). In general the network has extended in recent years. In 2005, the length of the distribution network was 24,792 km, and reached 36,292 km in 2012.

In total the amount of water delivered varied between 305 million m³ in 2005 to almost 358 million m³ in 2012. On average, around 185 million m³ per year are used by households, while economic activities use around 100 million m³ per year. There has been a visible increase in the business sector since 2007, while domestic consumption remains stable.

The connection ratio is estimated at 74 per cent on average in the country. There are significant differences in the level of coverage between regions but there has been visible improvement since 1997 (when the connection ratio was 63 per cent). The differences are even greater between the counties, and in particular between towns and municipalities.

Water supply on the islands, such as Brač, Hvar and Šolta, is ensured mostly by transporting water from the mainland although some supply comes from local sources, (e.g. on Cres and Vis), by means of ships-tranships (mostly for small islands or emergency

situations), by processing brackish water through the desalination process (e.g. on Lastovo and Mljet), or a combination of different sources (e.g. on Krk, Pag and Korčula).

The volume of water delivered by the public water supply system in the coastal area and on the islands increased in the years 2008-2011 from around 100 million m³ to 130 million m³. The amount of water supplied on the islands increased over the same period from 10 to 15 million m³, which is related to pressure from tourism.

In general, drinking water quality from public water supply systems is satisfactory, but there are great regional differences. The overall share of non-complying samples in Croatia was 0.4 per cent in terms of chemical parameters and 5.3 per cent in terms of microbiological parameters. This is a slight downward trend in the percentage of non-complying samples. The most frequent cause of non-compliance with chemical parameters is related to the natural properties of water, such as visible amounts of arsenic in the eastern part of Croatia, the presence of nitrogen salts, iron or manganese, higher total quantities of organic compounds and, in summertime, the intrusion of brackish water into the coastal zone.

Provision of water for water supply

To ensure the protection of ground and surface water for use as drinking water, protection zones have been established. In particular, river basins in the karst area require a special protection regime. Since 2005 there has been significant progress in reaching a good protection level. Areas intended for water abstraction for drinking water purposes are protected by designating sanitary water source protection zones. The decision to protect such sources pursuant to the Water Act has been taken for around two thirds of active sources. Registered sanitary protection zones cover a total 11,468 km², or about 20 per cent, of Croatia's mainland (map 7.1), with the biggest areas in the Adriatic Sea river basin district (5,899 km², including 172 km² on the islands) and in the Danube River basin district (5,569 km²). The major areas of the water protection zones are the restriction and control zones (zone III).

Table 7.1: Abstracted water, 1,000 m³

By water sources	2005	2006	2007	2008	2009	2010	2011	2012
Total	511,058	518,992	525,868	527,594	555,072	570,942	576,985	569,436
Groundwater	254,107	265,486	267,669	265,981	281,858	296,784	280,290	278,593
Springs	160,524	156,304	161,573	165,896	192,749	175,195	180,344	164,111
Water courses	43,236	44,178	42,871	48,617	45,246	43,699	49,893	51,625
Reservoirs	7,975	8,351	9,374	5,242	2,024	1,934	849	7,871
Lakes	9,576	9,131	10,043	15,983	11,897	11,402	10,947	10,754
Other water supply systems	35,640	35,542	34,338	25,875	21,298	41,928	54,662	56,482

Source: Statistical Yearbook, 2012.

Table 7.2: Water supply and losses, 1,000 m³

	2005	2006	2007	2008	2009	2010	2011	2012
Total abstracted	511,058	518,992	525,868	527,594	555,072	570,942	576,985	569,436
Total supplied,	305,819	318,180	323,453	354,434	355,016	365,281	349,692	358,311
of which								
Households	181,353	182,275	188,393	183,469	183,469	189,332	182,646	184,408
Economic activities	89,472	87,951	81,192	107,421	119,389	118,907	107,762	97,984
Distributed non charged water ¹⁾					20,557	22,323	26,347	19,437
Other	34,994	47,954	53,868	45,112	31,601	34,719	32,937	56,482
Water losses	205,239	200,812	202,415	173,160	200,056	205,661	227,293	211,125

Source: Statistical Yearbook, 2012.

Note: ¹⁾ Non-charged water - water that is taken from the water-supply network by unauthorized connections and not subsequently paid for by the end users.

7.2 Management of water use and prevention of pollution

Industrial use

The EIA procedure applied in Croatia also includes impacts on water resources related to water abstraction and water pollution. More detailed emissions control is provided through issuing environmental permits and water permits.

Pollution pressures from industry are more noticeable in the Danube River basin district catchment area than in the Adriatic Sea catchment area because of the higher population density and the higher level of industrial development. In the Drava and Danube Rivers sub-basins, textile, wood and food industries dominate, while in the Sava River sub-basin, the most significant activities are metal processing, chemical and petrol industries. The Adriatic River basin district specializes in tourist industry activities.

The average annual amount of water abstracted from watercourses for the needs of cooling facilities in Croatia is about 205 million m³, of which 10-20 per cent is lost in technological processes and the rest is drained back still hot into the watercourses. The largest users are thermo-electric power plants on the Sava River.

Thermo-electric power plants near the Adriatic coast use seawater as a coolant, and in the area of the Littoral-Istrian basins, more than 650 million m³ of seawater is used for cooling. Although there are no particular limitations to the amount of water available in Croatia, all adverse impacts on the water regime in the waterways need to be taken into consideration, especially during drought periods, as well as thermal pollution of inland and coastal water and related adverse impacts on the fish population and aquatic organisms.

Agricultural use

There is no systematic study of the environmental impacts of agriculture on water resources.

Until the beginning of the 21st century, agriculture in Croatia was centred on producing crops requiring negligible irrigation (cereal and corn). Thus, official records from 2004 show that on the entire territory of Croatia, 9,264 ha were irrigated, which is only 0.86 per cent of the agricultural land used at the time. With the implementation of the National Project of Irrigation and Land and Water Management, the area of irrigated land in Croatia increased by more than 60 per cent in two years, so that 15,000 ha of agricultural surfaces were irrigated in 2007.

Photo 7.1: Waste water treatment plant in Bartolovec**Map 7.1: Overview map of sanitary protection zones for water sources**

Source: Register of protected zones, September 2012. Draft River Basin Management Plan, 2012.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

This irrigation water is abstracted mainly from rivers and lakes, but uncontrolled abstraction of groundwater is widespread. In continental areas, irrigation is mostly used for vegetable and fruit growing. The biggest irrigated areas in the continental part of Croatia are in Varaždin, Virovitica-Podravina and Osijek-Baranja counties, whereas in coastal areas, irrigation is most prevalent in Istria and Dalmatia, especially in the Neretva River valley and in the areas of Kaštela in Split. In the areas of the Drava and the Danube basins, surface water from the waterways is most often used, but in Međimurje and Podravina, groundwater is also used for irrigation, although several multifunctional, currently unexploited reservoirs have been built in that area.

In the Adriatic Sea basin, water from open waterways (Neretva) or from mixed land-improvement drainage systems is used for irrigation systems and irrigation inside closed karst fields, and to a lesser extent groundwater, especially in the area of Istria, Kaštela and Ravni kotari. Profitable vegetable and fruit growing in the Adriatic basin is impossible without irrigation.

The amount of water used for irrigation is variable. In 2008, water used for irrigation amounted to about 6.33 million m³, rose to around 10.6 million m³ in 2009, and dropped to 8.65 million m³ in 2011. Water for irrigation is mostly abstracted from watercourses, although the share of water from reservoirs increased by 25 per cent from 2010 to 2011. Due to the development of the irrigation infrastructure, the number of pumping plants went from 5 in 2008 to 13 in 2010, while the number of sprinkling generating units increased from 27 to 52 in this period. The total capacity of the irrigation system increased from 750 l/h to around 2,400 l/h. Also the system of canals and pipelines was extended. The current trend is to use effective techniques like drip irrigation (117 ha of irrigated areas in 2010 compared to 46 ha in 2008) or sprinkling techniques, used on about 1,200 ha in 2008 and 1,600 ha in 2010.

On average, 400,000 tons of various mineral fertilizers are employed annually, mainly of domestic production. The maximum consumption was recorded in 2007 and 2008, followed by a downward trend. According to the data of the ministry responsible for agriculture, in 2007, 9,600 tons of pesticides were marketed. A considerable share of nutrient impacts also result from livestock farms, especially in the Danube River basin district. The cumulative input of farming activities amounts to about 56 kg nitrogen and 14 kg phosphorus per hectare of agricultural area (63 kg N and 16.5 kg P in

the Danube River basin district; 37 kg N and 8.3 kg P in the Adriatic River basin district). In the Danube River basin district, nutritive substances of organic origin are predominant, and in the Adriatic River basin district, more than two thirds consist of nitrogen and phosphorus from mineral fertilizer.

In line with the Water Act, the protection of vulnerable zones is in preparation, which involves identifying sensitive areas to protect rivers and lakes from agricultural impacts.

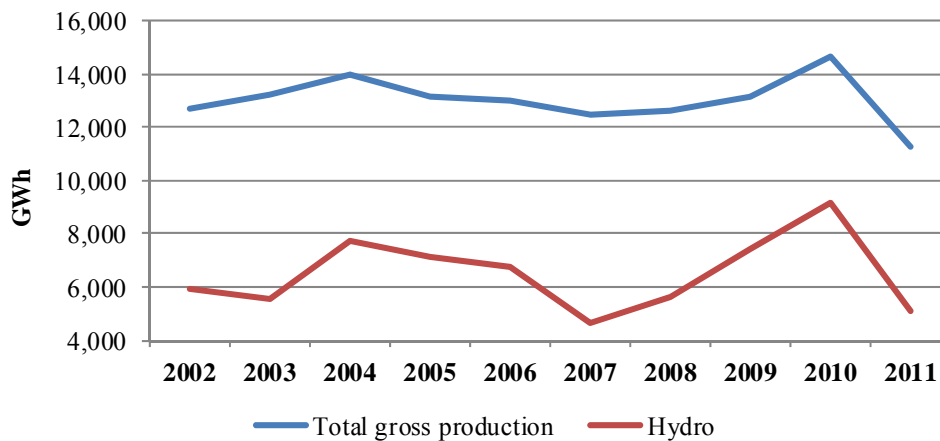
Hydropower energy production

There is no systematic study of the environmental impacts of the energy sector on water resources.

Croatia accommodates 17 large hydropower plants (> 10 MW) of storage and run-of-river types, 15 small hydropower plants (0.5 – 10 MW), 4 mini hydropower plants (0.1 – 0.5 MW) and several micro hydropower plants between 5 and 100 kW. Large artificial lakes represent a total volume of 1 billion m³ and primarily serve as reservoirs for hydropower plants. There are seven artificial lakes in Croatia.

The overall water energy potential that is technically exploitable in hydropower plants (without building new plants or improving? efficiency) has been estimated at 12,450 GWh/year in Croatia. In 2011, power plants used some 41 per cent of the country's total water energy potential, which is about 5,097 GWh/year. The most suitable locations for developing hydropower plants have already been used. Any additional hydropower plants would be located in valleys with a potential impact on surface and groundwater regimes. With this in mind, improving efficiency should be the first necessary step before building new hydropower plants. The construction and design of water structures and plants to use water power underlies requirements concerning the negative effects on the water regime in rivers, flood protection measures, health, infrastructure, wildlife and forests.

The main environmental aspects of hydropower plant construction and the main impacts on the environment of existing plants involve, on the one hand, a significant impact on the hydro-morphological and ecological state of water bodies and, on the other hand, a significant impact on the downstream flow and the loss of bed load. The consequences are a deepening of the original riverbed, reduced sediment transportation, and erosion processes on the river banks. The lower water level causes a lowering of the groundwater.

Figure 7.1: Production of electricity, GWh

Source: Statistical Yearbook, 2012.

Material is deposited upstream, reducing the velocity of the water flow. These dynamics are not in accordance with natural conditions and therefore the ecological state of waters is affected. Another main consequence of dams and other constructions is their effect on the linear passability for aquatic organisms and fish. As a consequence, the population may be reduced and the formation of native species affected.

The Croatian energy sector is potentially vulnerable to intensive drought. For example, the 2003 and 2007 droughts caused significant losses in production compared to the average. This resulted in increased costs for electricity production from €39-€46 million in 2003 to €102-€120 million in 2007.

Some projects planned for the hydropower industry concern flood management in reservoirs and improving the capacity of hydropower plants. In this context, three existing hydropower plants are scheduled for renewal in Varaždin, Čakovec and Dubrava in the north of Croatia on the Drava River.

Transport (inland and marine)

The Danube River is an international waterway and part of the European navigation system along its whole course through Croatia. The Drava (70 km) and Sava (376 km) Rivers are also international waterways. Ports of international significance are Osijek on the Drava River, Vukovar on the Danube, Slavonski Brod on the Sava River and Sisak on the Sava and Kupa Rivers. The most significant negative effects of waterways are hydro-morphological impacts on the water regime and the aquatic ecosystem as well as pollution from ships.

Illegal construction of banks and breakwaters in the Croatian coastal area probably constitutes the most

important negative effect on specific coastal landscapes and ecosystems (including marine and land areas). A particular problem is the fact that these are often irreversible changes, as the backfilled shores are almost never returned to their original “natural” state. The artificial expansion of the coastal area, including breakwater construction, leads to changes in the physical and chemical characteristics of the coastal region.

Land-based sources of pollution are still the major source of pollution in the Adriatic Sea, especially related to the nutrient load from the Po River (transboundary impact) and in the vicinity of bigger coastal cities. The input of pollution from inland into Croatian transitional and coastal waters occurs mostly through river inflows and is only controlled at the estuaries of larger rivers. Nevertheless, due to the activities undertaken in the framework of the Coastal Cities Water Pollution Control Project, environmental improvements have been observed in coastal areas in Croatia. In addition, sources of biological load are significantly present in transitional and coastal waters in the form of invasive organisms from other parts of the world (e.g. transported by ships’ ballast waters). An important issue related to maritime navigation is illegal waste into the marine environment and illegal operational discharges from ships. Nautical tourism also has a growing impact on the marine environment.

Tourism

Tourism is the main economic activity in the coastal area and on the islands, and as a result, during the tourist season months, significant pressures on the coast and Adriatic islands have been recorded through regular monitoring programmes.

Tourism affects the marine and coastal environment, e.g. through the construction of marinas and berths in inappropriate locations situated in the most beautiful and most vulnerable parts of the coast. Some problems resulting from nautical tourism still need to be addressed, such as waste and bilge, and water from ships. Drinking water supply in regions with big seasonal differences also causes severe problems. At the peak of the tourist season, water shortages occur in some areas, resulting in water rationing (chapter 9).

7.3 Water management

River basin management

The Government has adopted the River Basin Management Plan for the first planning period (2012-2015).

Flood protection

Croatia is subject to periodic flooding because of water and climate variability, causing considerable economic damage. In the period 2001-2007, floods caused damage amounting to €74 million.

Investments in the maintenance of flood protection systems were insufficient until the introduction of water protection charges for the water system in 2005. Since then, revenues have grown significantly, but are still insufficient for all necessary investments to develop the water protection system. The safety of the population and assets in many potentially flood-exposed areas is not yet ensured.

However, works are being carried out (table 7.3). There are regional differences in this respect and protection is generally much better in larger settlements and along large rivers. In the Danube River basin, the flood protection system has not been completed and unresolved issues remain, even on major rivers, such as the Sava and the Drava. In the Adriatic Sea basin, protection against storm water requires substantial improvement. Zagreb is the only city that is properly protected against floods from the Sava River. Other areas along the Sava River are mostly insufficiently protected.

The flood protection concept for the Danube, Drava and Mura Rivers is based on embankments and wide inundation belts along watercourses. Dams have been completed in almost all of the required areas, except in some sections along the old beds of hydroelectric power plants at Varaždin, Čakovec and Dubrava.

Experience has showed that on some sections the dams' height is not satisfactory and it is expected that they will be gradually reconstructed. Flood protection is also a matter of international cooperation. The Mura River was the object of a flood protection project involving Croatia, Hungary and Slovenia, completed in 2011. A 100-year protection level is ensured by a one-metre security zone.

Risks of artificial floods caused by the unexpected collapse or overflow of high dams are considered in the 2008 Strategy on Water Management. Documentation has been produced on the consequences of a possible collapse of dams impacted by floods, potential flooding areas have been marked out and alarm systems have been set up. The total surface of potentially threatened areas in Croatia amounts to approximately 680 km², most of which is situated in the water region of the Drava and Danube drainage basins.

Operational flood protection has also been implemented in compliance with the Croatian National Plan for Flood Protection, which includes ice protection activities and watercourse measurements. Operational flood protection in Croatia works well, as illustrated by the evacuation of high waters in the Danube River in 2002 and in 2006. To monitor and forecast hydro-meteorological conditions, Croatian Waters have implemented and automated several real-time water gauges in compliance with the Croatian National Plan for Flood Protection. Thus, data on water levels are available in real time to the head offices for flood protection, and water-level data are available to the public, e.g. on the Croatian Waters website. Data on measured precipitation levels are not available in real time, which can cause problems in operational flood protection activities in smaller drainage basins with shorter outflow concentration times. The number of forecasting points in some characteristic locations is insufficient.

7.4 Wastewater management

In Croatia, 103 wastewater treatment plants exist with a total capacity equivalent to 3.7 million people, and collected an average of 282 million m³ of wastewater annually from 2005–2012 (table 7.4). Domestic wastewater has increased significantly. In 2005, around 126 million m³ of wastewater originated from households, compared to about 184 million m³ in 2012. The increase of wastewater generated was observed due to an increasing connection ratio.

Table 7.3: Assets and resources protected from floods

	2005	2006	2007	2008	2009	2010
Settlements, number	764	624	505	495	520	644
Buildings, number	964	684	669	521	748	832
Railroads, km	380	380	487	343	423	423
Roads, km	2,608	2,396	1,799	1,619	2,021	3,116

Source: Statistical Yearbook, 2012.

Table 7.4: Wastewater collected, 1,000 m³

	2005	2006	2007	2008	2009	2010	2011	2012
Total	213,691	214,268	211,346	322,718	324,781	301,030	342,800	328,553
Households	126,316	131,938	131,939	128,403	127,033	189,332	182,646	184,408
Activities	85,281	79,743	76,726	100,803	99,883	54,656	86,335	62,447
Public utility services	2,094	2,587	2,681	..	..	..	..	..
Other water	..	..	..	93,512	97,865	57,042	73,819	81,668

Source: Statistical Yearbook, 2012.

In general, wastewater treatment plants operate preliminary, first- and second-level treatment. Two wastewater treatment plants operate third-level treatment (Zagreb City and Karlovac). Significant breakthroughs in wastewater treatment occurred in 2004 and 2007, when first- and second-level treatment was put into operation. Until 2007, most wastewater was only treated mechanically.

Approximately one third of the wastewater collected is discharged into the environment, for example into the sea, without any treatment (table 7.5). In general, the ratio between treated and untreated wastewater is better in the Adriatic Sea watershed than in the Black Sea watershed, but both areas are under development and a clear improvement has been visible since 2007.

A general characteristic of the water utility sector in Croatia is that the development of wastewater sewage services largely lags behind water supply services. There is also a significant gap between the percentage of the population provided with a wastewater treatment service (around 28 per cent or about 1.4 million inhabitants) and the percentage connected to the public sewerage system (43.6 per cent or about 1.95 million inhabitants). Looking at the capacity of wastewater treatment plants, it is obvious that the number of people connected is extremely low and a better connection rate could be achieved. Only 61 per cent of people connected to the public sewerage system also benefit from a wastewater treatment service.

Sewage sludge formation is a concern in the wastewater sector. Sewage sludge is generated as waste at wastewater treatment plants when cleaning urban or industrial wastewater. It contains nutrients like nitrogen and phosphorus as well as contaminants

like heavy metals, organic substances, pathogens and hormonally active substances, which can be harmful to the environment and health. Pre-treatment mainly involves stabilization (odour reduction) and volume reduction (thickening). In Croatia, around 8,000 tons of sewage sludge are annually generated and used in agriculture, discharged into the sea and end up in landfill. The optimal technique under such circumstances is thermal treatment because of several advantages like mineralization and best-possible inertization, destruction of organic pollutants, sanitation and energy recovery.

To protect the environment from the impacts of wastewater, some areas have been declared sensitive areas with a special regard to the collection and treatment of wastewater. In the Danube River basin district, efforts are being made to reach higher treatment standards for collected wastewater. Transitional periods for implementation have been elaborated in detail with regard to the sensitivity of basins and the size of agglomerations. Smaller cities in sensitive areas (2,000–10,000 person equivalent) will come under the second treatment level.

7.5 Legal, policy and institutional framework

Legal framework

The Croatian Constitution defines water as a resource of public interest and therefore guarantees it special protection. Other legal foundations of water management are defined by the Water Act (OG 153/09, NN 130/11, 56/13), the Water Management Financing Act (OG 153/09) and related secondary legislation, with individual provisions related to water found also in several laws which regulate other legal areas.

Table 7.5: Discharge of wastewater from the public sewage system, 1,000 m³

	2005	2006	2007	2008	2009	2010	2011	2012
Total	213,691	214,268	211,346	322,718	324,781	301,030	342,800	328,553
Untreated water	81,411	73,362	71,118	130,685	118,739	95,321	133,650	69,418
Treated water	132,280	140,906	140,228	192,033	206,042	205,709	209,150	259,135

Source: Statistical Yearbook, 2012.

The amendments of these acts have been adopted in line with the harmonization process to reach the EU *aquis*. The provisions of the Water Management Financing Act were incorporated into the 2013 Water Act.

The Water Act regulates and defines the legal status of water and water bodies as well as waterworks, the preconditions for their use and protection, and water management activities and organization. It defines water management revenues, the most significant of which are water charges, previously provided in the Water Management Financing Act. It determines the source of funds for water management financing, in particular water fees, and covers payment obligation, fee payers and targets for the funds (chapter 5).

In addition to these two acts, water management in Croatia is regulated by 48 by-laws, which concern different sectors, e. g. the Decision on designation of sensitive areas (OG 81/10), the Decision on the designation of vulnerable areas in Croatia (OG 103/12), the Ordinance on sanitary quality of drinking water (OG 47/08), the Ordinance on defining sanitary protection zones (OG 66/11), the Regulation on bathing waters (OG 51/10), the Regulation on sea bathing waters (OG 73/08; under the competence of the Ministry of Environmental and Nature Protection), the Regulation on water quality standards (OG 89/10) and the Regulation on fees for water protection (OG 82/10; 83/12).

The procedure of identifying sanitary protection zones is laid down by the Ordinance on the Conditions for Establishing Sanitary Protection Zones (OG, 66/11, 47/13). These sanitary protection zones are determined mostly on the basis of hydrogeological and hydrological conditions; and there are surveys that must be performed before the decision to adopt the zone is made by the responsible authorities (local self-Government units). Once the decision is made, the designated zones must be included into a physical planning document, to ensure the protection of water bodies identified as drinking water zones.

The Ordinance on management of sewage sludge (OG 38/08) provides requirements for the use of sewage sludge in agriculture with strict limit values

for heavy metals and organic substances. The new Act on Water for Human Consumption (OG 56/13) and the Ordinance on sanitary quality of drinking water (OG 47/08) provide requirements for drinking water quality.

Strategic documents, policies and programmes

One of the most important strategic documents concerning sustainable management of water resources is the 2008 Water Management Strategy (OG 91/08). This is a long-term planning document setting out the vision, mission, goals and tasks of the State policy on water management and a number of indispensable implementing rules and regulations. The main points of this strategy are the provision of a sufficient quantity of good quality drinking water for the population, as well as economic aspects, the protection of people against floods, and protection of the aquatic ecosystem.

In early 2013, the Ministry of Agriculture adopted an action programme for the protection of water against pollution caused by nitrates from agricultural sources in areas designed as vulnerable zones under the Water Act. It defines the authorized application of livestock manure on agricultural land and the periods when applying certain types of fertilizers is prohibited, restricts the land application of fertilizers according to soil type and slope, climatic conditions, rainfall and irrigation, and establishes the conditions for land application near water courses, land use and agricultural practice.

An Implementation Plan for Water Utility Directives was adopted by the Government in November 2010. The plan contains cost estimates and defines construction principles for the public water supply as well as wastewater collection and treatment systems. The strategic goal in developing the public water supply is to reach a connection ratio of 85-90 per cent by 2020 and to increase the connection level of the population to public sewerage systems, including wastewater treatment, by around 60 per cent by 2023. The investment programme for the implementation of the plan amounts to around €4.5 billion. The plan aims at a reform of the utility sector. Public water supply, wastewater collection and treatment activities

are carried out as a public service. A project on institutional options in the water supply and wastewater sector was completed in 2012 and led to a draft regulation on the same topic that is expected to be adopted.

Regulatory, economic, fiscal and information measures

According to the Register of Concessions for the economic use of water kept by Croatian Waters (Water Act, Article 137), over 600 concessions have been issued for the use of water. The right to use water power to produce electricity and for devices driven by water power is granted on the basis of a concession contract and a water rights permit. The basic principles behind the decision to grant the right to use water power are the greater public interest and a more rational use of water power.

Additionally, 500 active water intakes have been recorded for the purpose of the public water supply, mainly concerning groundwater. 245 public sewerage systems have been recorded on the basis of a water permit for the collection of wastewater. Water permits for wastewater discharges are issued for all discharges subject to the regulations on the limit values of wastewater emissions.

In total, 285 water permits have been issued to economic entities for wastewater sewerage, 91 of them to plants that are subject to integrated pollution prevention and control permits. For other activities, 49 water permits have been issued, most of them in the industrial sector. On the islands there are no recorded business entities with water right permits, or with prescribed limits for wastewater discharge. Industrial plants undertake their own pre-treatment in wastewater treatment plants before discharging into the water. The treated wastewater can be discharged either into the public sewerage system, thus involving further wastewater treatment, or into a natural water body, most often a surface water body, depending on available options. The conditions for wastewater discharge into a natural water body are much stricter and these are laid down specifically for each particular industry.

More than half of permits pertain to wastewater discharge into public sewerage systems. This type of industrial wastewater sewerage is characteristic in the Danube river basin district, where two thirds of legal permits relate to the discharge of industrial wastewater into public sewerage systems. Some 223 wastewater discharges from economic activities go into watercourses, and 35 end up in coastal waters, either directly or through the public sewerage system.

So far, 19 plants have been registered as discharging water underground.

Professional training programmes for operators of wastewater treatment units are being established. The first wastewater treatment plant offering on-site training now exists.

Institutional framework

Within the Ministry of Agriculture, the Directorate for Water Management is the competent authority for implementing the national policy on water management as well as transposing and coordinating the implementation of EU legislation such as the Water Framework Directive. The directorate also oversees the adoption of the Implementation Plan for Water Utility Directives and the development and supervision of urban wastewater management strategies and plans.

The legal entity for water management is Croatian Waters, which is a not-for-profit Government agency that is not funded from the budget. It is responsible for managing water, the public water estate, and protective and hydro-ameliorative water structures. It is run by the Management Board and the General Manager, both of which are appointed by the Government. Croatian Waters provides expertise and technical, economic and legal assistance.

The main tasks of Croatian Waters are the preparation of draft water management strategies, river basin management plans and water management programmes and plans, which form the basis for the supply of water for different uses, protection from water pollution, regulation of watercourses and other water bodies, and protection from adverse effects of water. Croatian Waters is competent to monitor water quality, collect water-related data and issue water permits. It also implements measures to ensure rational water use, water protection and flood protection as well as construction, co-financing and development of the water infrastructure.

For the purpose of water management, Croatian Waters has established six water management departments. Branch offices exist for smaller watersheds within the water management departments. The general responsibilities of the water management departments are implementing the River Basin Management Plan in each river basin district, monitoring and supervising implementation, and coordinating, monitoring, supervising and providing instructions and guidelines to water management branch offices.

Departments also ensure communication and cooperation with regional and local self-governments, regional units of Government bodies and State administration organizations, public institutions of regional and local significance, water users, payers of water charges and users of funds of Croatian Waters. They also represent the Government before courts.

A special water management role is allotted to the National Water Council, a body established pursuant to the Water Act, with members appointed by the Croatian Parliament. Its duties include systematic analysis of water management issues, coordination of different needs and interests, and proposing measures for developing and improving the water system. The Water Services Council was established for the purpose of ensuring the legality of pricing of water services and determining the socio-economically acceptable price of water for households in Croatia. Members of the Council are appointed by the Croatian Parliament upon the proposal of the Government. The Council proposes regulations specifying the base price of water services and the price to be paid by socially disadvantaged people for sufficient water supply to meet basic household needs.

The Ministry of Health, through the National Institute of Public Health, performs quality sanitary controls of drinking water. In the water supply network, the water is under constant supervision by the National Institute of Public Health and the sanitary inspection, which is responsible for monitoring drinking water sources (raw water).

The Ministry of Environmental and Nature Protection is in charge of monitoring sea bathing water quality on beaches as well as implementing the obligations of the Marine Strategy Framework Directive (2008/56/EC). The Ministry of Transport, Maritime Affairs and Infrastructure is in charge of maritime transport and protecting the sea from it. Waterways and inland water ports come under the competence of the Ministry of Maritime Affairs, Transport and Infrastructure as well as harbour administrations (management of ports and harbours).

7.6 Conclusion and recommendations

With the implementation of the Water Act and related regulations, the methods for assessing water quality have changed completely. The numbers of monitoring points have increased and other ways of measuring are now implemented. The result is a huge amount of different data collected, used and required by different institutions. A range of water

management stakeholders deal with inland water, seawater, bathing water and drinking water. Responsibilities are also split at different levels.

Recommendation 7.1

The Ministry of Agriculture, the Ministry of Environmental and Nature Protection, the Ministry of Health, Croatian Waters and CEA and other relevant institutions should improve information exchange by ensuring that:

(a) *Communication channels and contact persons are clearly defined on the horizontal and vertical levels;*

(b) *All institutions in the water management sector regularly provide water-relevant data in an agreed format to a designated institution in charge of gathering water-related data.*

Water losses are very high and represent 40 per cent of abstracted water. The reasons are varied, such as poor maintenance, illegal tapping and a leaky distribution system. In order to reduce negative influences on water quality and system efficiency (intrusion and extrusion), efficient measures such as modern techniques, better maintenance and new construction would minimize losses.

Recommendation 7.2

The Ministry of Agriculture, in cooperation with Croatian Waters and public water suppliers, should reduce water losses in the water supply network and ensure effective maintenance of the water supply systems.

The connection ratio to wastewater treatment plants is very low at 28 per cent of the population. Additionally, significant amounts of untreated wastewater are still discharged into water bodies. Unsatisfactory sludge management, including usage in agriculture and landfills, affects the quality of water bodies.

Recommendation 7.3

The Ministry of Agriculture should:

(a) *Increase the proportion of the population connected to the wastewater treatment plants to use full capacity of the plants;*

(b) *Continue ensuring that untreated wastewater is not discharged into water bodies;*

(c) *Improve management of sludge produced by wastewater treatment plants by the development of a coherent policy on sludge use.*

Measures have been taken through legislation on vulnerable zones and protection measures against

erosion on agricultural land. Nevertheless, the amount of nutrients from point sources and diffuse sources is still significant and has an impact on surface waters.

Recommendation 7.4

The Ministry of Agriculture should further promote sustainable farming practices.

BIODIVERSITY AND PROTECTED AREAS

8.1 Trends in species and ecosystems

Croatia includes 3 of the 11 biogeographical regions present in Europe: Alpine, Continental and Mediterranean, but also there are some elements of the Pannonian region. The number of known taxa (species and subspecies) is almost 38,000 (table 8.1). Many species are under threat or at different levels of threat. The most vulnerable are freshwater fish, reptiles, amphibians, dragonflies and birds (table 8.2).

During the last 10 years, Croatia has produced its red books and red lists according to International Union for Conservation of Nature (IUCN) criteria. The State Institute for Nature Protection (SINP) has produced a new red list for flora. Red lists of freshwater crustaceans, algae, sea grass, terrestrial and freshwater gastropods and a red book of corals are being compiled. The first red data book was published in 2003 and the second edition is due for publication online in 2014.

The SINP has also produced a “green” list and a “green” book for indigenous or autochthonous breeds/species connected to some endangered habitats. This is in response to the Convention on Biological Diversity (CBD) obligations on habitats (Aichi Target 13). In Croatia, autochthonous breeds have developed over hundreds of years of use and practice; 26 breeds are at risk because of the increased mechanization of agriculture. These breeds generally have low productivity and therefore there is little interest in maintaining them on farms. However, they are of great importance for the management of grasslands and the conservation of biodiversity. Almost 17 per cent of grasslands on the Croatian territory depend on extensive farming using traditional breeds. Many of these species are used as food because of the quality of their meat; they are adjusted to the climate and surroundings, have stronger resistance, and are useful for habitat maintenance. They often feed themselves on invasive plant species, resulting in long-term savings for the country.

The national classification of habitats (compiled according to the European Union Nature Information System (EUNIS) classification) defines ten main classes of habitat (table 8.3), and is prescribed by the

2006 Ordinance on the classes of habitat types, habitat map, threatened and rare habitat types, and by measures for the preservation of habitat types. This Ordinance protects all habitat types protected by the EU Habitats Directive, Resolution No. 4 of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), and those threatened on national level.

8.2 Trends in development and management of protected areas and ecological networks

Protected Areas

In 1999, Croatia established eight national categories of nature protection. A new category of regional parks was introduced in the Nature Protection Act in 2003. The total area (mainland and sea) under permanent protection in Croatia steadily increased over the period 2009-2012 (table 8.4 and map 8.1). By the end of 2012, there were 431 nature sites protected in nine categories (table 8.5). The national protected areas feature internationally recognized protected areas including five Ramsar sites (Crna Mlaka, Lonjsko polje and Mokro polje, Kopački rit, Neretva River Delta and Vransko Lake), two biosphere reserves (Mura-Drava-Danube Regional Park, and Kopački Rit Nature Park), and a World Heritage site (Plitvice Lakes National Park).

No management plans for national parks or nature parks were in place in 1999. National parks had a “physical plan” which the Government recognized was inadequate in providing management solutions. The management authority and protected area directors are now responsible for developing protected area management plans. Protected areas in Croatia are obliged to have management plans. Of the eight national parks, five have management plans, two have plans in the final consultation phase and one is establishing a draft management plan. Eight of the eleven nature parks have management plans. SINP is tasked with reviewing management plans and providing an opinion on their suitability before approval by the ministry. Visitor management is included in the management plan framework. Some protected area authorities have developed visitor management plans, but there is no obligation to do so.

Table 8.1: Number of known and endemic taxa

	Total number of known taxa	Number of endemic taxa	Share of endemic taxa, %
Total	38,266	1,093	2.86
Plants	8,871	523	5.90
Fungi	4,500	0	0.00
Mammals	101	5	4.95
Lichens	1,019	5	0.49
Breeding birds/total ¹⁾	387	0	0.00
Reptiles	41	9	21.95
Amphibians	20	7	35.00
Freshwater fish	152	17	11.18
Saltwater fish	442	6	1.36
Terrestrial invertebrates	15,228	350	2.30
Freshwater invertebrates	1,850	171	9.24
Marine invertebrates	5,655	0	0.00

Source: Biodiversity of Croatia, State Institute for Nature Protection, 2009.

Note: ¹⁾ Recorded total of 387 bird species, of which 233 nesting birds.

Table 8.2: Number of plant and animal taxa included in red list by group and IUCN categories

Group	EX	RE	CR	EN	VU	NT	LC	DD	Total
Total	1	43	314	332	473	427	266	600	2,456
Vascular plants	1	10	90	62	71	186	0	340	760
Fungi	0	0	55	77	119	0	0	63	314
Lichens	0	0	3	11	32	8	2	0	56
Mammals	0	5	0	4	3	21	1	8	42
Birds - nesters	0	13	17	23	14	36	34	10	147
Birds - non-nesters	0	2	3	10	2	19	9	1	46
Reptiles	0	0	2	2	0	6	0	6	16
Amphibians	0	0	1	1	2	3	0	1	8
Freshwater fish	0	6	15	20	29	11	2	8	91
Marine fish	0	3	5	8	11	28	36	32	123
Butterflies	0	0	5	2	4	10	0	17	38
Dragonflies	0	2	6	5	5	12	0	6	36
Ground beetles	0	0	38	35	63	76	143	40	395
Stoneflies	0	2	1	3	11	4	26	35	82
Corals	0	0	8	20	37	7	13	31	116
Cave fauna	0	0	65	49	70	0	0	2	186

Source: Statistical Yearbook, 2012.

IUCN categories - EX-extinct; RE-regionally extinct; CR-critically endangered; EN-endangered; VU-vulnerable; NT-near threatened; LC-least concern, DD-data deficient.

Table 8.3: Habitat types according to the EUNIS classification

Habitat type	EUNIS code	Surface km ²	share %
Total		56,608	100
Marine habitats	A	20	0.04
Coastal habitats	B	20	0.04
Inland surface waters	C	588	1.04
Mires, bogs and fens	D	..	..
Grassland and lands dominated by forbs, mosses or lichens	E	9,972	17.62
Heathland, scrub and tundra	F	1,925	3.40
Woodland, forest and other wooded land	G	24,928	44.04
Inland unvegetated or sparsely vegetated habitats	H	60	0.11
Regularly or recently cultivated agricultural, horticultural and domestic habitats	I	8,973	15.85
Constructed, industrial and other artificial habitats	J	2,651	4.68
Habitat complexes	K	7,471	13.20

Source: Fourth National Report to the CBD, Ministry of Culture, 2009. ECE secretariat calculations.

Map 8.1: Protected areas



Source: SINP, 2013.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Photo 8.1: Mandarin tree in Dubrovnik



Table 8.4: Percentage of protected areas

	Total protected area km²	Per cent of total national territory
2009	6,624.14	7.56
2010	6,626.83	7.56
2011	7,486.67	8.54
2012	7,486.67	8.54

Source: Register of Protected Areas of the Ministry of Environmental and Nature Protection, 2013.

Note: National territory includes land and sea.

Table 8.5: Protected areas, 2012

	Number	Total area km²	Mainland km²	Sea km²
Total	431	7,486.68	6,870.40	616.28
National park	8	976.66	756.96	219.70
Nature park	11	4,196.22	4,008.33	187.89
Strict reserve	2	24.73	24.73	0.00
Special reserve	79	426.04	305.96	120.07
Regional park	2	1,027.92	1,027.92	0.00
Forest park	32	34.21	34.21	0.00
Significant landscape/seascape	85	1,373.57	1,280.66	92.91
Nature monument	84	2.27	2.27	0.00
Horticultural monument	128	8.59	8.59	0.00

Source: Register of Protected Areas, 2013.

Ecological networks

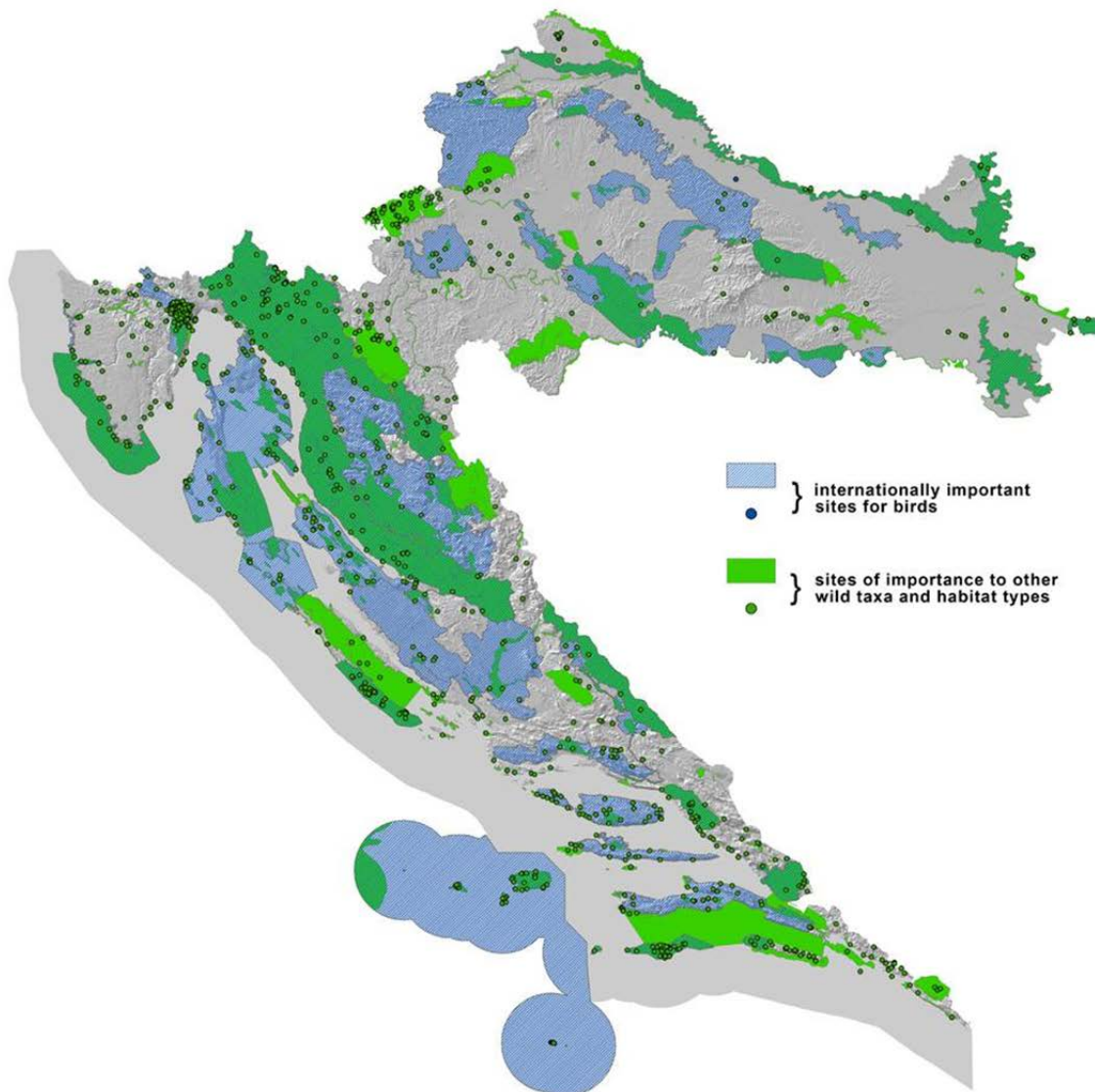
Croatia established its national ecological network (map 8.2) in 2007. It covered 47 per cent of the mainland area and 39 per cent of the marine area. The network included 1,510 important sites for species and habitat types, 40 areas of importance for birds, and 2 ecological corridors (migration corridors for birds and marine turtles).

The national ecological network is based on work originally carried out by Croatia to identify the Areas of Special Conservation Interest (ASCI) that form the Emerald Network of the Bern Convention. Resolution No. 5 of the Bern Convention states that “for contracting Parties which are Member States of the European Union Emerald Network sites are those of the Natura 2000”, which links the Emerald Network with the Natura 2000 Network. Croatia established its Emerald Network sites first, and subsequently these are included in the proposal for Natura 2000 sites.

Since 2007, Croatia has been carrying out activities under the EU Natura 2000 network of protected areas. The final list of Natura 2000 sites was adopted in September 2013 by the Government following a period of public consultation which ended on 5 June

2013. The final list contains over 700 proposed sites of community importance (of which 174 are caves) and 38 special protected areas (SPAs). Together, they cover over one third of the country and around one sixth of the territorial sea, putting Croatia at the top of the league table along with Slovenia and Bulgaria in terms of percentage of territory included in Natura 2000. The SINP hosts a website devoted to Natura 2000 with an interactive map and an explanation of the consultation process concerning the establishment of the national Natura 2000 ecological network (<http://www.natura2000.hr/Home.aspx>).

The enforcement, monitoring and management of the Natura 2000 network represent a challenge for the future, given the lack of national systematic monitoring and insufficient capacity and equipment. Some species are currently monitored: large carnivores and some bird species. A regionally dispersed team is needed to be able to monitor all Natura 2000 species and habitats at national level. The nature protection information system is also challenging since it represents continuous work that requires financial and human investments. However, Croatia is planning to ensure adequate financing to fully implement its obligations regarding Natura 2000 requirements for the next programming period.

Map 8.2: Croatian Ecological Network in 2007

Source: SINP, 2013.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

8.3 Pressures on species and ecosystems

Fisheries

Concerning marine ecosystems, some species in the sea are subject to overfishing, with no monitoring even though quotas exist. The total quantity of catches and production of sea fish, crustaceans, oysters and other molluscs and shellfish in Croatia increased from 44,111 tons in 2005 to 69,748 tons in 2012 (+58%) (figure 8.1). However, other groups show an opposite trend. For instance, catches of oysters and other molluscs and shellfish decreased from 4,184 tons in 2005 to 1,680 tons in 2012 (-

59%). During the same period, catches of pelagic fish increased from 32,046 tons in 2005 to 58,687 tons in 2012 (+83%) (table 8.6).

Economic development

Currently, 35.84 km³ of water is used to produce electricity annually, of which 97.4 per cent is from waterways, 2.2 per cent from accumulations, and the rest from other resources. The construction of hydropower plants and accumulation pools has significantly modified river flows, with negative impacts on the whole series of habitats and living communities that belong to them.

Table 8.6: Catches and production of sea fish, crustaceans, oysters, other molluscs and shellfish

	Total	Pelagic fish		Other fish	Crustaceans ¹⁾	Oysters, other molluscs and shellfish ¹⁾
		Total	of which pilchards			
2005	44,111	32,046	16,521	7,623	258	4,184
2006	52,037	38,346	16,950	8,357	298	5,036
2007	51,819	37,221	16,900	8,893	451	5,254
2008	60,187	46,399	21,194	9,331	461	3,996
2009	66,619	53,659	28,815	9,137	529	3,294
2010	63,252	50,303	26,749	9,298	543	3,108
2011	77,759	66,618	46,051	9,026	505	1,610
2012	69,748	58,687	43,527	8,894	487	1,680

Source: Statistical Yearbook, 2012.

Note: ¹⁾ Data refer to edible and non-edible fish.

The country lacks an estimation of the impact on the environment, including a nature impact assessment, in order to identify which planned hydropower plants will have a significant negative impact on species and their habitats.

One of the most difficult problems to address in the country is related to hydropower and energy investments. Croatia has adopted an Energy Development Strategy until 2020 with the objective of increasing investments in the construction of energy infrastructure for the next seven years in order to reduce its dependence on energy imports.

An example of such a hydroelectric project is the planned construction of a 68 MW underground power plant close to the Vilina Cave – Ombla Spring. An environmental impact assessment prepared after mounting pressure from civil society was published in March 2013, and identified potential negative impacts on a large number of cave species.

As a result, the EBRD decided to withdraw the loan approved to finance the project. In addition, Croatia is supporting the construction of small hydropower plants of less than five MW on six watercourses. The proliferation of these small hydropower plants results in a considerable impact on the surrounding nature, including valuable ecosystems and species.

Agriculture

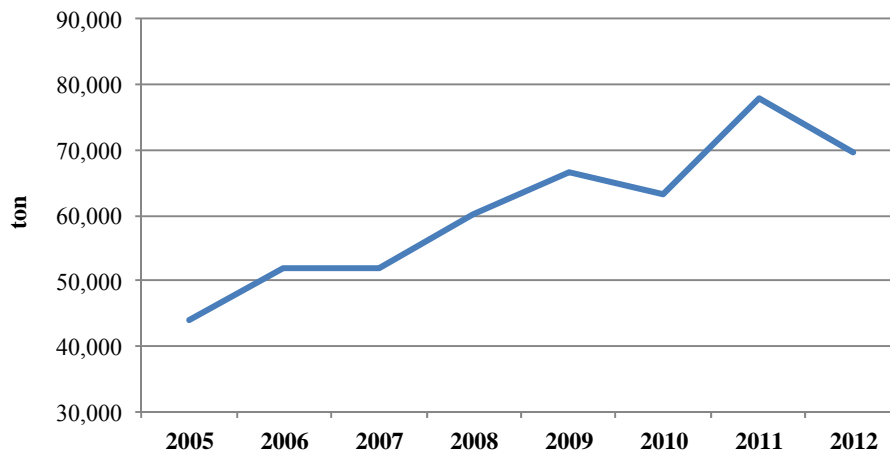
The main pollution problem is related to nitrogen and potassium emissions from agriculture. However, the total consumption of mineral fertilizers decreased from 401,164 tons in 2008 to 278,872 tons in 2011 (-30%) (table 8.7). Other concerns related to species and habitats are the loss of autochthonous species, the abandonment of certain farming practices that

support biodiversity, and the conversion to more intensive agriculture.

One third of the proposed Natura 2000 ecological network is agricultural land. Statistics show that Croatia has a significant number of very small farms that are unlikely to convert to intensive agriculture. Bigger farms established in the last few years readily comply with EU legislation, including that related to the environment, in order to have access to subsidies, and are aware of their obligations. For example, many farmers are aware that grasslands need to be maintained for grazing, and mow them once a year to receive payment.

Staff interviewed from the Ministry of Environmental and Nature Protection highlighted that cooperation on farming with the Ministry of Agriculture has increased significantly and that the two ministries are jointly developing agri-environment measures, revising cross compliance conditions, and organizing training across Croatia to help farmers apply for incentives.

A working group has been set up with the Payment Agency (the agency that provides payments to farmers), the Ministry of Agriculture and other relevant institutions in the agricultural sector to work on agri-environment measures. These measures are needed to provide incentives to farmers for implementing voluntary measures that are beneficial for nature protection but that may affect agricultural production. Regarding seeds and genetic resources, Croatia has been following OECD and FAO advice on the use of plant species. Effectively, GMOs cannot be planted, not even for testing purposes, and GMO products cannot be sold in the country (0.2 per cent of GMO content in a product is the maximum allowed).

Figure 8.1: Total catches and production of sea fish, crustaceans, oysters, other molluscs and shellfish

Source: Statistical Yearbook, 2012.

Table 8.7: Consumption of mineral fertilizers, tons

	Total ¹⁾	Quantity of fertilizers used				Active ingredients			
		Total ²⁾	Type			Total	N	P ₂ O ₅	K ₂ O
			Nitrogen	Phosphorous	Potassium				
2005	366,534	135,534	58,005	2,808	9,438	61,360	25,841	15,096	20,423
2006	364,476	114,476	49,285	3,969	9,909	50,118	20,789	12,188	17,141
2007	413,900	133,614	59,944	4,658	10,003	60,088	26,316	14,372	19,400
2008	401,164 ³⁾	198,434	73,810	388	3,062	94,674	37,683	23,557	33,434
2009	337,028 ³⁾	139,988	63,089	560	4,389	61,872	28,399	13,593	19,880
2010	307,255 ³⁾	132,795	58,623	4,258	9,147	61,260	28,162	14,231	18,867
2011	278,872 ³⁾	122,023	55,336	3,639	9,316	53,216	24,603	12,390	16,223

Source: Statistical Yearbook, 2012, 2011, 2010.

Notes: ¹⁾ Data on mineral fertilizers used by legal entities and parts thereof include estimated data on consumption on private family farms.

²⁾ Difference with total amount is due to mixed and composite fertilizers.

³⁾ Data taken from administrative sources.

Hunting

A total of 1,061 hunting grounds exist in Croatia. Around 315 are state-owned and managed and the rest of them are jointly managed by the State and county authorities. The State grants concessions or leases of its hunting grounds to legal and natural persons (hunting associations). At county level, hunting grounds (also known as common hunting grounds) can only be leased.

Each hunting ground is managed according to a ten-year hunting management plan. According to the Nature Protection Act, natural resources management plans contain nature protection conditions. Management measures can vary to reflect different species and habitats, e.g. some game species cannot be hunted and management plans will provide for their protection. In the area of game management, communities cooperate to develop management plans

and include protective measures. The Hunting Act (OG 140/05 and 75/09) provides for the collection of fines if measures are violated.

Since 1999, the quantity of game bagged has significantly increased for some game species (table 8.8). However, this is explained by the fact that the central hunting records database was established in 2005. In 1999, available data were based mostly on certain hunting grounds and by no means covered all grounds on Croatian territory. Since 2005, the database has been input with more accurate data.

Figures for wild boar increased from 9,827 in 2005 to 24,496 in 2012; for bear from 23 in 2005 to 86 in 2011; for roe deer from 8,127 in 2005 to 14,211 in 2012; and for other deer from 1,405 in 2005 to 3,542 in 2012. The number of hunters also increased, from 43,110 in 2005 to 64,617 in 2012 (+50%).

Table 8.8: Hunting

	2005	2006	2007	2008	2009	2010	2011	2012
Number of hunters	43,110	49,232	54,763	56,049	57,870	57,766	62,129	64,617
Game bagged								
Roe deer	8,127	8,764	11,175	11,689	11,388	11,284	13,373	14,211
Other types of deer	1,405	1,599	2,738	2,139	2,520	2,916	3,394	3,542
Bear	23	58	61	76	88	99	86	..
Wild boar	9,827	10,445	17,527	18,679	18,243	18,409	21,871	24,496
Hare, rounded	14,000	7,000	10,000	21,000	21,000	22,000	24,000	23,000
Common pheasant, rounded	65,000	77,000	70,000	84,000	54,000	68,000	58,000	56,000
Fox, rounded	11,000	11,000	11,000	9,000	10,000	10,000	10,000	..
Waterfowl, rounded	6,000	9,000	19,000	15,000	21,000	23,000	19,000	24,000

Source: Statistical Yearbook, 2012, 2011, 2010.

Forest fires

High forests cover 37 per cent of national territory and the rest are different degrees of degraded forest vegetation. The majority of forest trees are broad-leaved, namely 81 per cent. Coniferous forests cover some 14 per cent of the country (table 8.9).

Forests in Croatia today belong to the first or second generation following the natural restoration of vast primary forests in the area between the Sava and Drava Rivers and the karst region south of the Kupa River. No less than 95 per cent of forest vegetation is in its natural state, which is rare and extremely valuable at both European and global level. Almost all of the forest habitats in Croatia belong to the Natura 2000 habitat types protected by the EU Habitats Directive.

One of the main threats to forests in Croatia is forest fire, especially in the Mediterranean part. The statistical data varies from year to year (table 8.10) and largely depends on weather patterns.

Urbanization

The conservation of landscape diversity is affected by the increased trend in urbanization and population on the Adriatic coast. Lowland and coastal landscapes are some of the most endangered landscapes in Croatia, but there are also impacts on landscape diversity in rural areas due to migration to the cities and land abandonment, in particular in grassland areas. Croatia is vulnerable to biological invasions and experiences serious problems resulting from the intentional and unintentional introduction of alien species. Over 350 alien species have been listed in the country, some of which have become invasive. Their negative impacts on biodiversity, human health and many socio-economic interests have increased due to human activities such as trade, mobility and different economic sectors, coupled with global

climate change. Historically, problems with Invasive Alien Species (IAS) in Croatia started in 1910, when 11 specimens of the Indian mongoose - *Herpestes auropunctatus* - were introduced to the island of Mljet where they exterminated most of the snake population over 20 years and attacked a number of other small animals and birds. Invasive species on the islands present a special problem since island ecosystems are particularly sensitive due to their isolation. Allochthonous game species, such as fallow deer – *Dama dama*, spotted deer – *Axis axis* or wild boar – *Sus scrofa*, have been introduced to islands and continental hunting grounds, and today also pose problems.

Currently, lists of IAS still do not exist or are partial for many taxonomic groups. However, a preliminary list of invasive alien plants was established comprising 64 taxa, which is available on the Flora Croatica Database web page <http://hirc.botanic.hr/fcd/>. A well-known terrestrial invasive species is *Ambrosia artemisiifolia*, which affects grassland habitats and native plant species, and is also the cause of allergies. The *Amorpha fruticosa* species was purposefully introduced due to its honey-giving properties but is now outgrowing lowland wet grassland areas.

Alien species

In 2006, SINP and the Croatian central State administration body competent for nature protection published the red book of freshwater fish of Croatia, listing 19 alien freshwater fish species. In addition, four new species have been recorded since 2012. Freshwater biodiversity is highly threatened by invasive alien invertebrates, such as the mussels *Corbicula fluminea*, *Dreissena polymorpha*, *Anodonta woodiana*, the snail *Potamopyrgus antipodarum* and the crayfish *Orconectes limosus* and *Pacifastacus leniusculus*.

Table 8.9: Forest area, hectares

	Forest area at the end of			
	2008	2009	2010	2011
Total	2,227,416	2,233,354	2,231,883	2,231,764
Broad-leaved trees	1,801,630	1,810,890	1,817,934	1,816,031
Conifers	317,182	313,351	303,892	303,495
Degraded forest (maquis, garigue, shrub, serub)	108,604	109,113	110,057	112,238

Sources: Statistical yearbooks 2010, 2011 and 2012

Table 8.10: Forest damage caused by fire, hectares

	2005	2006	2007	2008	2009	2010	2011
Total burned-over area	629	2,981	12,628	3,449	2,789	1,900	3,277
of which in State forests	579	2,981	5,647	2,879	2,300	1,455	2,788

Sources: Statistical yearbooks 2010 and 2012

Pressure from IAS in the Adriatic Sea is increasing. The tropical green algae *Caulerpa taxifolia* and *Caulerpa racemosa* are spreading rapidly across the Adriatic Sea's coastal benthic habitats. *C. taxifolia* was initially observed at two locations in 1994 and at another one in 1996. The invasive, green algae *Caulerpa racemosa* was first found in autumn 2000 near the Pakleni Islands. By the end of 2005, this algae had been observed at 43 locations, from Cavtat to the island of Vis, including one spotting near Vrsar (Istria). At least 35 species became new elements of the Adriatic ichthyofauna up until 2007, represented by 22 families, out of which eight families are new to the Adriatic: Hemiramphidae, Leiognathidae, Haemulidae, Siganiidae, Ipnopidae, Zoarcidae, Monacanthidae and Cylopteridae. Since 2007, two new fish species have been recorded: *Terapon theraps* and *Fistularia commersonni*. Several projects and activities on IAS have been conducted in recent years or are on-going:

- The project "Estimated level of bio-contamination of the Sava River basin - a step towards the common strategy for monitoring the status of invasive alien species into transboundary watercourses of Croatia and Slovenia" started in 2012, as a result of the collaboration between the Faculty of Science of the University of Zagreb - Division of Biology, and the National Institute of Biology, Ljubljana, Slovenia.
- Through the EU Natura 2000 Integration Project (NIP), lists of alien species for bryophyte, fungi, algae and lichens and for all vertebrates and 15 invertebrate taxonomic groups are being compiled until 2014.
- In 2010, the project of developing and

implementing a faunistic database (CRO fauna) started as part of the NPIS (Nature Protection Information System), financed from the IPA 2007 – TAIB/TAF programme, led by SINP. The CRO-fauna database will be designed to store all relevant information on IAS needed for an efficient early warning and rapid response system.

- In June 2012, with the support of the Global Environment Facility – GEF, Croatia started the National Biodiversity Planning project to support the implementation of the CBD 2011-2020 Strategic Plan in Croatia in order to update and revise the current Strategy and Action Plan for the Protection of Biological and Landscape Diversity (NBSAP). The draft outline for the new NBSAP will have been prepared by 2014. This strategic document will also define some strategic objectives and action plans in relation to IAS.
- Related to promoting nature conservation and raising awareness among the interested public, the Ministry of Environmental and Nature Protection has established a new web portal for nature protection, www.zastita-prirode.hr, to provide the public with easy access to information on nature protection issues in Croatia.
- As part of an educational and awareness-raising campaign, SINP has produced a new website on IAS, www.invazivnevrste.hr. This website should become a part of the Croatian early warning and rapid response system on IAS and contains considerable information about IAS in Croatia.
- In 2012, SINP produced one article per month on invasive alien species that was published in GEO magazine.

- In 2013, SINP worked on developing and testing the risk assessment system. A minimum of 10 species were assessed and preparation started on “white” and “black lists” of alien species.
- In February 2012, one specimen of signal crayfish was recorded in the Korana River, after which a rapid response was initiated. Eradication action comprising 150 crayfish traps was implemented by 20 local volunteers, coordinated by SINP and involving the Ministry of Environmental and Nature Protection, the Faculty of Science of the University of Zagreb, the Public Institution for Governing Protected Natural Assets in Karlovac County, “Natura Viva”, and volunteers from the local NGOs Sedra, RK Žabac and KPA Karlovac. The project will continue in the coming years.

8.4 Legal framework

Nature Protection Act

The first Nature Protection Act was adopted in 2003; a new version was adopted in 2005 and revised in 2008 and 2011. The nature protection acts were subsequently amended, for example to take into account Croatia’s international obligations under biodiversity-related conventions, such as CBD and CITES, and the relevant EU regulations that had to be introduced into national legislation. The 2005 act implements the same concept for the conservation and sustainable use of biodiversity, but provisions on genetically modified organisms (GMOs) were removed to be replaced by a new, separate act, as well as some provisions that were considered non-viable in practice. A new Nature Protection Act was adopted by the Croatian Parliament in July 2013. Among the improvements, the new act:

- Fully transposes and harmonizes with EU legislation, especially in terms of appropriate assessment procedure and species protection regime;
- Defines clearer and more systematic protected areas and Natura 2000 management;
- Establishes conditions for future ratification and implementation of the 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;
- Improves protection and prevention of the importation, placing on the market, and introduction of invasive alien species in line

with good international practice and experience;

- Applies CITES and EU regulations by proclaiming the Act on transboundary movement and trade in endangered wild species.

Environmental Protection Act

The Environmental Protection Act (OG 80/13) contains general environmental protection policies to fulfil the requirements for sustainable development including the protection of soil, water, sea, flora and fauna.

Other legislation

Forest genetic biodiversity preservation is part of the 2005 Forest Act and subsequent revisions (OG 140/05, 82/06, 129/08, 80/10, 124/10, 25/12 and 68/12) and forest management plans. In addition, there is a separate forest reproductive material act (OG 75/09, 61/11 and 56/13). In order to combat IAS, actions include, inter-alia, the issuance of:

- Order for eradication of ambrosia (*Ambrosia artemisiifolia* L.) (OG 72/07) by the Ministry of Agriculture;
- Order for eradication of signal crayfish (*Pacifastacus leniusculus*) from inland waters (OG 39/12) by the Ministry of Environmental and Nature Protection in order to prevent the further spread of signal crayfish and their negative impact on Croatian biodiversity;
- Order for eradication of wild boar (*Sus scrofa*) from the Adriatic islands (OG 49/12) by the Ministry of Environmental and Nature Protection in order to prevent the further spread of wild boar and their negative impact on Croatian biodiversity.

8.5 Policy framework

National strategies and action plans for the protection of biological and landscape diversity

1999 Strategy

The 1999 First National Strategy and Action Plan for the Protection of Biological and Landscape Diversity spanned the years 1999 to 2008. In its review of the achievements from 1999 to 2008 in the area of protection of biological and landscape diversity, the Government, in its fourth National Report to the CBD, pointed to the following achievements, amongst others:

- Strengthening of State- and county/local-level nature protection institutions;
- Establishment of the Nature Protection Directorate and the State Institute for Nature Protection;
- Establishment and operationalization of county institutions for protected area management;
- Accession, ratification and implementation of all biodiversity-related MEAs;
- Establishment of the national nature protection legislative framework largely aligned with the EU acquis;
- Establishment of the national legislative framework concerning genetically modified organisms;
- Systematic process for inventorying the components of biodiversity and the publication of Red Lists of threatened fungal, plant and animal species and Red Books for certain groups of plants and animals;
- Mapping of habitats;
- Successful implementation of a large number of international projects financed from different sources, including EU funds, focusing on nature protection strategies and activities, as well as institutional strengthening.

The Report on the State of Nature for the period 2000-2007 was accepted by the Croatian Parliament in 2008. It provides a further detailed analysis of achievements from 2000-2007. The review of the implementation of the 1999 Strategy reveals a lack of attention to the actual implementation of action plans.

2008 Strategy

The 2008 Strategy took into account a great number of changes that had occurred since the adoption of the 1999 Strategy. The Conference of the Parties to the Convention on Biological Diversity agreed to reduce the rate of biodiversity loss by 2010; numerous new work programmes, new activities and guidelines were promoted under the CBD as well as other biodiversity-related conventions to which Croatia had acceded, and these needed to be addressed.

At national level, the EU accession process mandated Croatia to adopt new legislative and institutional frameworks for the conservation and sustainable use of biodiversity, resulting in a revision of the previous strategic objectives and guidelines on biological and landscape diversity. In 2014, the Ministry will start preparing a new national biodiversity strategy to address new obligations under both the EU and the

CBD, such as the Aichi Biodiversity targets and the CBD Strategic Plan 2011-2020 agreed in 2010. The CEA, separately and in accordance with the 2009 Sustainable Development Strategy (OG 30/09), is also preparing action plans for the protection of the Adriatic Sea, coastal area and islands.

Large carnivore management plans

The second lynx management plan for 2010-2015 was prepared under the auspices of the Ministry of Environmental and Nature Protection based on the implementation of the 2004 plan. The population of the lynx has declined in the last 15 years and it is considered one of the most endangered mammal species in Croatia; it is strictly protected. Among the large carnivores, the lynx is subject to the least scientific research and, as a predator at the top of the food chain, its protection is complex.

It is in direct competition with human beings and the management plan has an ultimate goal of conserving Croatian biodiversity by ensuring the protection of the lynx. Wolf management also requires a complex protection plan given that wolves are in great conflict with human beings and that their actions may affect livelihoods and cause economic loss. The wolf management plan covers the period from 2010-2015 and was prepared under the auspices of the Ministry of Environmental and Nature Protection. The brown bear management plan was prepared under the Ministry of Agriculture and published in 2008.

8.6 Institutional framework

Ministry of Environmental and Nature Protection

Institutional strengthening at national and county levels has involved raising nature protection activities to ministerial level: establishment of the Nature Protection Directorate in 2000, currently part of the Ministry of Environmental and Nature Protection; the State Institute for Nature Protection (SINP) as the central expert institution for nature protection (2002); and public institutions for the management of protected natural assets (CPIs-20 in total) at county level. Since 2008, counties have been in charge of the environment and nature protection at regional level, and administrative bodies are in place at county level.

The Ministry develops policy and legislation on nature protection. The majority of focal points for biodiversity-related MEAs concern ministry staff. Scientific committees are hosted by the SINP, while enforcement lies with the inspection authorities. The supervision of nature protection occurs at two levels.

At ministerial level, senior inspectors carry out national inspections, currently with 15 inspectors. At local level, chief supervisors are involved in inspections at county level, currently with 163 supervisors. In this way, enforcement and inspection authorities have branches at local level.

Management of protected areas

Public institutions or authorities that manage nature parks and national parks are financed primarily from the State budget. They are able to keep the profits they make, with the most profitable parks being Krka and Plitvice Lakes. For the other 7 categories, management has been delegated to county authorities; each of the 21 counties has a public institution whose main task is to manage protected areas on their territory. Local authorities have difficulties managing protected areas due to lack of capacity, knowledge and staff. However, projects financed by the EU and other international financial sources support these counties in capacity-building activities and management, although not in hiring new staff. Some institutions have insufficient staff to manage all the protected areas under their responsibility.

Ministry of Agriculture

The Ministry of Agriculture, through its Directorate of Fisheries, develops the legislative and economic framework and regulations related to aquaculture and fisheries.

Croatian Environment Agency

The Croatian Environment Agency maintains the national information system for environment protection and prepares environment status reports (Chapter 3).

State Institute for Nature Protection

The State Institute for Nature Protection (SINP) is the central institution carrying out expert tasks concerning nature protection. These include: carrying out inventories; monitoring and assessing the state of nature; preparing expert base proposals for the protection of natural assets; conserving areas of nature; establishing the conditions for nature protection; managing protected areas and the use of natural resources; developing expert base proposals for the assessment of acceptability of interventions in nature; reporting on the state of nature; participating in the implementation of international agreements on nature protection; and organizing and implementing

educational and promotional activities on nature protection.

Croatian Forests

Croatian Forests is a State-owned company in charge of managing the country's State-owned forests and implementing forest management plans. Croatian Forests only manages forest areas, with the public authority for nature protection managing protected areas. Annual inspections are carried out by both the Ministry of Environmental and Nature Protection and the Ministry of Agriculture at county level but independently; occasional ad hoc inspections are made if deemed necessary. The sector for forestry and hunting inspections at the Ministry of Agriculture is involved in these inspections. Inspectors check whether the forest management plan, which also includes some forest biodiversity issues, is being followed as required. However, it is the local or national nature protection authorities (depending on the category of protected area) that are responsible for the environmental and biodiversity aspects of managing the protected area. Sometimes both forest and nature protection authorities work together on the field to check and approve management plans.

Other institutions

With regard to genetic resources, a national gene bank exists with samples of autochthonous species only. The Museum of Natural History and the Veterinary University maintain tissue banks for wolves, lynxes, bears and dolphins, and there is a Falcon Centre in Šibenik. The Agronomy University and the Croatian Agriculture Agency keep seed banks.

Current forest practice in Croatia supports the preservation of genetic biodiversity by establishing different categories of seed sources as well as a seed bank. The basis for the successful preservation of genetic forest resources is strictly defined regions of provenance; for example, seeds may be collected by registered official operators only in one ecological area and placed in a similar ecological situation for preservation. Biodiversity is also supported through compliance with the Forest Stewardship Council (FSC) standards in State forests, such as the when introducing fruit trees.

Cooperation with NGOs

National NGOs participate in nature protection working groups run by the Ministry of Environmental and Nature Protection and provide

data for reports. An NGO coalition works on river surveillance, bird watching, monitoring of certain species and winter counting. Most bird monitoring is carried out by national NGOs and the ornithological institute. From 2006 to 2012 inventories were made for collecting data for Annex 2 of the Birds Directive, involving national NGOs. In general, NGOs consider that their main job is to oppose the Government's actions rather than work with it as a stakeholder in nature protection activities.

8.7 Economic instruments

To address the problems of fear of wolves and damage to livestock, the Government pays farmers compensation for damages caused by wolves, and the Ministry of Environmental and Nature Protection is exploring innovative mechanisms, such as giving farmers dogs from autochthonous mountain breeds to keep away the wolves.

8.8 Selected projects

The SINP carries out monitoring projects (box 8.1) to obtain data for the evaluation (or re-evaluation) of the conservation status of species and to create Red Lists. According to established practice, five years after evaluating the conservation status of a species, a re-evaluation is carried out for some groups of species. The SINP engages experts on certain taxonomic

groups to carry out revisions, either as part of an existing cooperation and/or through contracts. Financing comes from the Ministry of Environmental and Nature Protection. One or two projects are supported by funds allocated to monitoring or inventorying species of importance to Natura 2000. In the last decade, for example, funds have been heavily invested in the preparation of the Natura 2000 proposals. It is an obligation of the State to finance this work and a number of funds have been secured, including the Environmental Protection and Energy Efficiency Fund. In 2011, the Croatian Parliament ratified an agreement with the World Bank for a €20.8 million loan to finance the Natura 2000 Integration Project (NIP).

Biodiversity projects

The project National Biodiversity Planning to Support the Implementation of the CBD 2011-2020 Strategic Plan in Croatia (2012-2014) (financed by GEF through UNDP) builds on the current status and achievements of Croatia with respect to its obligations related to the Convention on Biological Diversity (CBD), in particular the country's biodiversity planning and Convention reporting processes, and its commitment to implement, at national level, the CBD's Strategic Plan for 2011-2020. Activities began in late 2012 and will end by the middle of 2014.

Box 8.1: Large carnivore monitoring in Croatia

Monitoring of wolves is carried out by the SINP with the assistance of the Veterinary Faculty. The role of the SINP is to gather data on the state of the wolf population and prepare annual reports. Such reports provide the basis for decisions about quotas. Currently, wolves may only be hunted in small numbers in Croatia according to quotas and as a derogation to the regulation. Hunting quotas are only established when the population is stable. There is a yearly contract with the Veterinary Faculty to do this type of work. The wolf management plan was produced with a highly participatory approach, involving workshops with different stakeholders and consensus decisions. Wolf management plans are prepared every five years, and quotas are estimated by the large carnivore committee each September. Wolf mortalities must be reported and measured using DNA; special permission must be sought from the CITES authorities to keep a trophy. Croatia is cooperating with Slovenia on a first transboundary management and monitoring plan for wolves. The two countries are currently monitoring data jointly to get a better idea of wolf activity around the borders, especially as some collar-carrying wolves have been killed. It is estimated that around 50 packs of wolves live in Croatia, with 25 packs on the border with Slovenia and Bosnia and Herzegovina.

Bears may currently be hunted according to the management plan and set quotas. Hunters may keep bear trophies but a tissue sample and blood for analysis must be provided as part of the regulations before releasing the trophy. Also according to the regulations, the meat of hunted bear cannot be exported; therefore a trophy consists of the fur and head of the animal. There is evidence of illegal hunting, but it is unclear whether this is in addition to the authorized quota, and SINP experts maintain that it does not affect the sustainability of the population. Since 1 July 2013, bears have been a strictly protected species, and may only be hunted as a derogation, similar to wolves.

The lynx is the most endangered mammal species in Croatia, with a very small population. Lynxes may not be hunted. There are problems with in-breeding, and bringing in new samples is being considered. This animal is the least well known of all large carnivores in the country, with only sporadic monitoring and camera traps to identify individual lynxes. The first monitoring report of the lynx population is in preparation with recommendations on management.

Source: State Institute for Nature Protection

8.9 Conclusions and recommendations

Croatia has made significant efforts to strengthen relevant legislation related to nature conservation and subordinate regulations and ordinances, establish required compliance mechanisms, and strengthen the institutional framework for biodiversity conservation.

The Ministry of Environmental and Nature Protection and the Ministry of Agriculture have increased their cooperation in the area of agri-environment schemes under the Common Agricultural Policy (CAP) in support of nature protection, including Natura 2000 habitats and species. However, the record for cooperation and enforcement of nature protection measures is weaker in the area of water management, which poses high risks to biodiversity, especially threatened species, and for forests. In addition, in the field of hunting, with the change in the status of the bear in Croatia as an EU member State, there is an opportunity for a more coordinated approach to develop a new bear management plan.

Recommendation 8.1:

The Ministry of Environmental and Nature Protection should:

(a) *Together with relevant institutions, enforce nature protection measures and address the major threats to biodiversity caused by the introduction of invasive species;*

(b) *Work with the Croatian Forests to put in place mechanisms to raise awareness on the need to protect biodiversity in forests;*

(c) *Together with the hunting authorities at the Ministry of Agriculture, revise the bear-management plan following the new status of "strictly protected species" granted to bears.*

The objectives of improving economic development and increasing hydropower energy sources seem to be in conflict with the Government's objectives and obligations of ensuring the conservation and sustainable use of biodiversity, and especially protecting habitats and species against unsustainable development threats.

Recommendation 8.2:

The Ministry of Environmental and Nature Protection, together with the Ministry of Agriculture and Croatian Waters and the energy sector, should ensure implementation of nature protection measures in order to reduce the pressures on biodiversity caused by hydroelectricity generation.

Some small projects address the economics of ecosystems and biodiversity and the value of natural assets. The Government has not yet achieved sustainable financing for biodiversity conservation and managing protected areas and for ensuring that biodiversity values are mainstreamed in decision-making processes. Given that Croatia depends greatly on the tourist industry, especially tourists attracted to the coast, the costs of not investing in nature, or of the loss of biodiversity due to unsustainable development and economic pressures on natural resources, should be made evident to policy-makers.

Recommendation 8.3:

The Ministry of Environmental and Nature Protection should:

(a) *Carry out studies related to the valuation of biodiversity and ecosystems;*

(b) *Promote public and private investments in nature conservation.*

Natura 2000 is considered as one of the most important tools to ensure the favourable conservation status of threatened species and habitat types. Some good progress has been made in implementation. Croatia proposes a network of over one thousand sites that are key to the long-term conservation of endangered species and habitats. The great number of sites and the surface areas they cover illustrate Croatia's exceptionally rich biodiversity.

However, the management of these sites is a challenge. Some sites are very small, just a few hectares (e.g. bogs), others are huge and already protected as nature parks, like the Velebit Mountain, others still are underground (bat caves) or far out at sea (underwater reefs). Adequate monitoring is not yet in place. The development of the nature protection information system is not finalized and long-term maintenance of such a system requires financial and human investments.

Recommendation 8.4

The Ministry of Environmental and Nature Protection should strengthen efforts to:

(a) *Continue ensuring adequate management of the Natura 2000 network;*

(b) *Ensure adequate monitoring of biodiversity;*

(c) *Complete the development of a functional nature protection information system and ensure its long-term maintenance and updating.*

Chapter 9

TOURISM AND ENVIRONMENT

9.1 Current situation

Tourism potential

Sun and sea tourism

The most important tourism potential in Croatia is the Adriatic Sea. Its 6,278 km-long coastline, 4,398 km of them island coastlines, and 1,244 islands, islets and cliffs, including 50 inhabited islands, combined with a mild climate, have long been recognized and promoted as the main comparative advantages of Croatian tourism. The “TOMAS” study by the Institute of Tourism revealed that most tourists (over 90%) visit Croatia for the sun and sea. Few tourists come to Croatia because of its other attractions, which confirms the need to define, shape and adequately promote these forms of tourism.

Continental Croatia, from a tourism point of view, still remains insufficiently and/or inefficiently exploited, even though it offers potential tourist attractions. For example, towns with rich and interesting history and architecture; shrines; thermal water springs with healing properties; rivers; ski resorts of regional significance; old memorials and scenic roads; vineyard tours; national parks, and other protected areas.

Ecotourism

Ecotourism includes two significant sectors: small groups with a special interest in ecotourism who spend their whole vacation this way; and large numbers of tourists who spend their vacation, for example, on the beach, but also take part in “short nature excursions”.

Croatia has 8 national parks, 11 nature parks and countless arboretums, botanical gardens, wetlands, and other valuable habitats. Bird-watchers in Croatia have multiple opportunities to observe a variety of feathered phenomena. The Caput Insulae Ecology Centre on Cres Island is an educational centre devoted to protecting the rare griffon vulture.

The Lonjsko Polje Nature Park is home to numerous wetlands and bird sanctuaries. The village of Cigoc and villages in the surrounding area not only comprise habitats for hundreds of species of insects,

fish, amphibians, and birds, including Cigoc's famous storks, but, as historic settlements, protect collections of ethnographic artefacts. The Kopački Rit Nature Park in Slavonia on Croatia's eastern border is the country's most fascinating wetland. Besides huge bird populations, the area is beginning to attract cyclists, hikers, and wine lovers thanks to the redevelopment of bike trails, removal of land mines, and a rebirth of the region's vast vineyards.

Croatian national parks, and other highly attractive protected areas, offer huge potential for ecotourism development, rural tourism, year-round mountain holidays, and excursion tourism. The main obstacle to development is that areas of special natural value are not yet organized or equipped to accept and offer high-quality stays to a large number of guests. Developing a trekking infrastructure, a system of signposts, rest areas, and an adequate transportation system would improve the tourism potential of these areas. However, it is imperative to preserve nature and control traffic through these protected areas.

Ecologically produced food has also become an important factor in defining the tourism on offer and differentiating it in the market. Opportunities could be further developed to produce ecologically grown food and sell it in facilities catering to tourists to reflect the increasing importance of this segment of the tourist market.

Cultural tourism

The term “cultural tourism” describes journeys that include visits to cultural resources, whether they are tangible, such as archaeology, architecture, paintings and sculptures, or intangible, such as folklore, interpretative arts, storytelling and drama, and regardless of the primary motivation. Cultural tourism represents an increasingly significant share of tourist supply. During their vacation in Croatia, some 70 per cent of visitors participate in at least one cultural event or visit a cultural monument. A number of locations in Croatia are listed as UNESCO World Heritage Sites, such as Plitvice Lakes, Šibenik Cathedral, Euphrasian Basilica in Poreč, the old towns of Trogir and Dubrovnik, and Split with its Diocletian palace. The country has 175 museums and collections with an inventory of domestic and world heritage, attracting 2.1 million visitors per year.

Photo 9.1: Tourist information centre in Zagreb**Box 9.1: Research on cultural tourism in Croatia**

A study of cultural tourism in Croatia was carried out in 2008. It was the first comprehensive study of visitors' attitudes to and consumption of cultural attractions and events in Croatia, coming eight years after implementation of the Strategy on Development of Cultural Tourism. The research aimed at collecting data on the characteristics of tourism demand and cultural visitors' consumption of cultural attractions and events in Croatia. It also aimed at determining motivation and satisfaction relating to visits to cultural attractions/events and the travel characteristics of cultural tourists.

Most foreign cultural tourists identified Croatia as having a rich cultural and historical heritage (84%), unique customs, traditions and gastronomy (72%) and well-endowed museums and galleries (71%). Between 50 to 60 per cent of tourists said that Croatia offers festivals and events, a rich cultural and artistic life and is a pleasant destination for travels motivated by culture.

Finally, culturally motivated tourists mostly visit cultural and historical sights and attractions (64.9%), churches and monasteries (64.1%), museums and galleries (58.6%), festivals (42.2%), thematic routes and roads (33.2%), musical events and shows (32.5%). On the continent, festivals are more popular, as indicated by 65 per cent of visitors, while on the coast 42 per cent of visitors take part in festivals. In Croatia, 20.4 per cent of tourists come on vacation with the aim of exploring culture, and 26.4 per cent say their main reason for travelling is to visit cultural attractions and events. Thus, a high percentage of visitors can be considered as culture-motivated tourists who travel specifically to visit cultural attractions and events or motivated by culture while on vacation.

The vast majority was satisfied with their visit, which exceeded expectations for 48 per cent of tourists and met expectations for 47 per cent.

Source: Tomljenović, R., Marušić, Z. (2009). Attitudes and Consumption of Cultural Attractions and Events in Croatia: Tomas Cultural Tourism 2008, Institute for Tourism, Zagreb.

Cultural offerings in Croatia are inadequately presented (box 9.1). Improving identification and signs for cultural and historical monuments, installing information charts, adjusting the operating hours of museums and castles, and creating an attractive presentation would significantly increase the quality of cultural tourism offerings. The

organization of a wide spectrum of events and an imaginative presentation of cultural values would be conducive to the development of tourism geared towards different experiences on the basis of Croatia's cultural potential. One of the components of the country's cultural and historical heritage likely to appeal to a broad range of tourists is traditional

food and cuisine. The diversity of indigenous Croatian meals could contribute to the development of culinary tourism.

Thematic tourism

Thematic tourism has become one of the most important catalysts of development. It is mainly based on the 3-E principle: entertainment, excitement, and education, and therefore includes tourism offerings and contents which combine these three elements.

Croatia has enormous potential because of its cultural heritage and natural beauty, which can be combined in a countless number of ways to tempt tourists seeking unique experiences.

Adventure tourism

Adventure tourism in Croatia is still a niche market with potential for growth. Croatia has the natural resources to develop very diverse aspects of adventure tourism, such as white water rafting, canoeing, kayaking, paragliding, hot air balloon flights, free climbing, off-road racing, and many other activities.

Religious tourism

Croatia has the potential for religious tourism, which is already active in Marija Bistrica.

Nautical tourism

Owing to the length of its coast and the number of islands, Croatia provides the adequate setting for the intensive development of nautical tourism, as well as package tours. Fulfilling the needs of this demanding segment could potentially make a considerable contribution to tourist traffic as a whole in Croatia. One unexploited potential area is to include rivers in package tour selections.

Wellness tourism

Wellness tourism, one of the most significant trends in tourism today, also has a place in Croatian tourism. In the past few years, wellness has become an essential part of hotel and tourist deals in Croatia. Increasing numbers of hotels, especially on the coast, include wellness arrangements in their offers.

The sea air and thalassotherapy, as well as innumerable healing thermal springs in the

hinterland, require an adequate infrastructure in order to position themselves in the quality tourism market. One of the greatest advantages of such tourism is that it is a year-round business activity.

Other types of tourism

Corporate travel, conventions and incentive tourism are becoming increasingly significant. This segment is lucrative, and primarily takes place outside the summer peak season. Closely associated with conventional tourism, but specific in terms of its dynamics and the image it generates,

Croatia is also developing scientific tourism. Support for institutions in their efforts to organize international scientific gatherings and research projects would influence Croatia's development as a regional academic and scientific centre. This would attract an increasing number of foreign experts, scientists, professors and researchers. The necessary prerequisite for developing convention and scientific tourism is the construction of quality convention centres, both in Zagreb and Dubrovnik.

Development in tourism activities

In 2012, Croatia had a successful tourist season with a total of 11.835 million tourist arrivals and 62.743 million overnight stays (table 9.1). The largest travel market in Croatia in 2012 was Germany with 1.853 million arrivals, followed by Slovenia (1.054 million), Italy (1.051 million), Austria (0.946 million) and the Czech Republic (0.647 million). Other important tourist generating markets include France, Hungary, the Netherlands, Poland, Slovakia, and United Kingdom.

The total accommodation capacity remained fairly stable (table 9.2). Ninety per cent of capacity is concentrated in seaside resorts. In terms of types of accommodation facilities, in 2011 the highest number of tourists (8.521 million) stayed in collective accommodation facilities (hotels, villas, resorts, tourist apartments). A significant number of tourists stayed in private accommodation facilities (households, rooms, apartments, summer houses, rural households), at 2.935 million, followed by camping sites with 2.231 million. Statistics are incomplete, as some guests who come on holiday are not recorded individually. Also, the Croatian Bureau of Statistics does not specifically categorize the other types of accommodation (e.g. farm houses), which could be relevant to give an idea of the profile of cultural tourists coming to Croatia.

Table 9.1: Tourist arrivals and overnights, 1,000, 2005-2012

Year	Arrivals			Nights		
	Total	Domestic	Foreign	Total	Domestic	Foreign
2005	9,995	1,528	8,467	51,421	5,434	45,987
2006	10,385	1,726	8,659	53,007	5,985	47,022
2007	11,162	1,856	9,306	56,005	6,431	49,574
2008	11,261	1,846	9,415	57,103	6,478	50,625
2009	10,935	1,600	9,335	56,300	5,799	50,501
2010	10,604	1,493	9,111	56,416	5,424	50,992
2011	11,456	1,529	9,927	60,354	5,603	54,751
2012	11,835	1,466	10,369	62,743	5,221	57,522

Source: Statistical yearbook, 2012.

Table 9.2: Accommodation capacities (rooms) by type of facility, situation on 31 August 2012

	2007	2008	2009	2010	2011
Total	326,792	332,060	333,237	315,864	321,417
Zagreb	4,927	5,472	5,137	5,479	5,551
Bathing resorts	2,060	2,126	2,310	2,369	2,297
Seaside resorts	305,801	309,705	310,491	291,758	295,647
Mountain resorts	2,975	3,032	3,044	3,057	3,133
Other tourist resorts	1,975	2,160	2,131	2,147	1,953
Non-tourist resorts	9,054	9,565	10,124	11,054	12,836

Source: Statistical yearbook, 2012.

Table 9.3: Accommodation capacities (beds) by type of facility, situation on 31 August 2012

	2007	2008	2009	2010	2011
Total	944,076	968,610	969,726	909,951	934,564
Zagreb	9,911	10,977	10,243	11,008	10,706
Bathing resorts	3,881	4,124	4,608	4,784	4,601
Seaside resorts	890,358	911,420	911,035	847,072	863,565
Mountain resorts	8,839	9,018	8,934	9,078	9,191
Other tourist resorts	4,432	4,835	4,893	4,809	4,262
Non-tourist resorts	26,655	28,236	30,013	33,200	42,239

Source: Statistical yearbook, 2012.

Regarding the geographical spread, according to data from 2012, Istria County had the highest number of tourists (2,985,042), followed by Primorje-Gorski Kotar County (2,353,404), Split-Dalmatia County (1,834,876), Dubrovnik-Neretva County (1,122,420), Zadar County (1,074,192), and Šibenik-Knin County (657,371). Dubrovnik-Neretva, Zadar and Šibenik-Knin counties traditionally accommodate mass tourism. Istria and Primorje-Gorski Kotar counties offer a combination of coastal tourism and content tourism, where tourism policy is focused on a diverse supply, and recorded a very high number of overnight stays compared to other destinations that primarily target mass tourism, with 19,877,368 for Istria County and 11,974,337 for Primorje-Gorski Kotar County. In terms of travel organization, data show that a total of 10.604 million tourists registered in Croatia in 2010, of which 6.659 million came individually and 3.945 million were on organized

trips. While the number of tourist arrivals did not change significantly in the period 2007-2012, the number of tourist overnight stays increased by almost 6.7 million from 56 million in 2007 to 62.7 in 2012 (table 9.4).

Seasonality and extra capacity

In Croatia tourism is highly seasonal. Hotels on the coast are fully booked during July and August. In May, June and September, their occupancy rate is between 60 and 70 per cent, while during the rest of the year, occupancy is on average below 25 per cent. In November, part of December, January and February, many hotels close. The main reasons for this are too few guests, routine hotel renovations during the winter months, and employee vacations. Most hotels open again in March in order to be ready for Easter.

Table 9.4: Tourist arrivals and nights, by type of tourist resort, thousands, 2007-2011

		2007	2008	2009	2010	2011	2012
Total	Arrivals	11,162	11,261	10,935	10,604	11,456	11,835
	Nights	56,005	57,103	56,300	56,416	60,354	62,743
Zagreb	Arrivals	613	649	578	609	666	701
	Nights	1,057	1,102	969	1,007	1,092	1,157
Bathing resorts	Arrivals	123	124	104	107	110	106
	Nights	435	443	384	363	365	357
Seaside resorts	Arrivals	9,586	9,608	9,406	9,029	9,749	9,978
	Nights	52,649	53,573	52,911	52,869	56,439	58,102
Mountain resorts	Arrivals	277	283	274	275	280	300
	Nights	432	444	430	430	448	469
Other types of tourist resorts	Arrivals	163	171	152	155	150	158
	Nights	340	374	351	357	341	362
Other resorts	Arrivals	400	426	420	429	501	592
	Nights	1,092	1,167	1,255	1,390	1,669	2,297

Source: Statistical yearbook, 2012.

Overnight stays in marinas

The number of overnight stays in marinas continues to rise. In the period 2005-2008, the average annual growth rate was eight per cent. Of the total number of overnight stays in marinas recorded in 2008 (1.4 million), the highest number of boat tourists visited Šibenik-Knin County (27%), followed by Zadar County (22%) and Istria County (19%), accounting for two-thirds of the tourist traffic relating to boat tourists. This is due to the concentrated offer of accommodation capacities for boat tourists and the number of moorings. The majority of the 18,000 moorings in Croatian marinas are located in Zadar County (25%), Istria County (24%) and Šibenik-Knin County (18%); the only littoral county with no marinas is Lika-Senja County.

Developments in 2013

In 2013, the number of tourist arrivals in all commercial accommodation facilities in Croatia was 5.1 per cent higher than in 2012. These visitors stayed for a total of 64.8 million nights: 7.9 per cent by domestic and 92.1 per cent by foreign tourists. In 2013, the number of domestic tourist nights decreased by 1.6 per cent, while the number of foreign tourist nights increased by 3.8 per cent, as compared to the same period of 2012. Concerning the structure of foreign tourist nights, the most of them (73.0%) were realised by tourists from Germany (24.2%), Slovenia (10.3%), Austria (8.7%), the Czech Republic (7.6%), Italy (7.4%), Poland (6.8%), the Netherlands (4.2%) and Slovakia (3.8%).

Most Adriatic counties recorded increases in visitor numbers and nights stayed in 2013, although there were also some decreases. Split-Dalmatia County

received 11.1 per cent more tourists than in 2012 (9 per cent more tourist nights), Dubrovnik-Neretva County 10.6 per cent (8.3% more tourist nights), Šibenik-Knin County 9 per cent (9% more tourist nights), Zadar County - 1.2 per cent (0.5% less tourist nights), Primorje-Gorski kotar county 1.1 per cent (3.1% more tourist nights). Istria received 0.1 per cent fewer visitors, who stayed for 2.2 per cent fewer nights was the only county in the Adriatic Croatia to record a fall in both visitor numbers and nights stayed. 14.2 per cent more visitors came to Zagreb in 2013 than in the same month the previous year, staying for 16.6 per cent more nights.

Economy and employment in the tourism sector

Contribution of the travel and tourism sector to GDP

In Croatia, the direct contribution⁷ of the travel and tourism sector to GDP was HRK 34,474.5 million (11.9 per cent of total GDP) in 2012, and is forecast to rise by 0.4 per cent in 2013, and by 6.1 per cent per annum during 2014-2023, to reach HRK 62,839.4 million by 2023 (in constant 2012 prices). The total contribution⁸ of the sector to GDP was HRK

⁷ The direct contribution of travel and tourism to GDP reflects the total spending within a particular country on travel and tourism by residents and non-residents for business and leisure purposes plus Government spending on travel and tourism services directly linked to visitors, such as cultural tourists (e.g. museums) or recreational visitors (e.g. national parks).

⁸ The total contribution of travel and tourism includes its wider impacts on the economy (i.e. indirect and induced impacts), in addition to direct impacts. The indirect contribution includes GDP and jobs supported by:

80,684.6 million (27.8% of GDP) in 2012, which is forecast to fall by 0.2 per cent in 2013, and then rise by 5.9 per cent per annum to HRK142,820 million in 2023.

In 2012, inbound and domestic leisure travel spending generated 92.2 per cent of direct GDP (HRK 67,945.7 million) compared with 7.8 per cent for business travel spending (HRK 5,752.5 million). Business travel spending is expected to grow by 2.7 per cent in 2013 to HRK 5,909.8 million, and rise by 3.5 per cent per annum to HRK 8,342.1 million in 2023. Leisure travel spending is expected to grow by 1.5 per cent in 2013 to HRK 68,989.4 million, and rise by 5.9 per cent per annum to HRK 122,313 million in 2023. Domestic travel spending generated 14.9 per cent of direct GDP in 2012 compared with 85.1 per cent for visitor exports (i.e. foreign visitor spending⁹ or international tourism receipts). Domestic travel spending is expected to grow by 0.2 per cent in 2013 to HRK 10,979.1 million, and rise by 3.4 per cent per annum during the period 2014-2023 to reach HRK 15,358.6 million in 2023. Visitor exports are expected to grow by 1.9 per cent in 2013 to HRK 63,920.1 million, and rise by 6.1 per cent per year to total HRK 115,297 million in 2023.

Contribution to employment

In 2012, the sector directly supported 138,500 jobs (13.1 per cent of total employment). This is expected to remain unchanged in 2013 and rise by 2.3 per cent per annum to 174,000 jobs (15.6 per cent of total employment) in 2023. In 2012, the total contribution of the sector to employment, including jobs indirectly supported by the industry, was 30.2 per cent of total employment (319,000 jobs). This is expected to fall by 0.5 per cent in 2013 to 317,500 jobs and rise by

investments in travel and tourism, including investment activity such as the purchase of new aircraft and construction of new hotels; Government 'collective' expenditure, which helps travel and tourism in many different ways as it is made on behalf of the 'community at large' – e.g. tourism marketing and promotion, aviation, administration, security services, resort area security services, resort area sanitation services; domestic purchases of goods and services by the sectors dealing directly with tourists - including, for example, purchases of food and cleaning services by hotels, fuel and catering services by airlines, and IT services by travel agents. Imported purchases are not included as part of the indirect contribution as these represent leakages. The induced contribution measures GDP and jobs supported by the expenditure of those who are directly and indirectly employed by the travel and tourism industry.

⁹ Visitor exports – spending within the country by international tourists for both business and leisure trips, including spending on transport

2.2 per cent per annum to 396,000 jobs in 2023 (35.4 per cent of total).

9.2 Pressures from tourism on the environment

There is no comprehensive information on the pressure tourism puts on the environment in Croatia. However, some sporadic data and indicators are scattered over different institutions and publications. For instance, the Croatian Environment Agency publishes an annual brochure, "The Environment in Your Pocket". Using selected indicators, the brochure presents an overview of the state of the environment and the environmental trends in Croatia. Each brochure includes two selected indicators relating to tourism. Tourism is also one of the topics addressed in each State-of-Environment Report.

There are no estimates of the energy and resources used in tourism in Croatia. However, some case studies have been carried out with some tangible results.

For instance, a case study on Rovinj was part of the Plan Bleu project, "Sustainability profiles in some Mediterranean tourist destinations". It was based on an experimental method, and involved measuring and assessing the impacts of tourism from the perspective of the key goals of the Mediterranean Strategy for Sustainable Development (MSSD), taking into account environmental, social and economic issues in the destinations studied. A "profile of sustainability" was produced using the DPSIR approach (Drivers – Pressures – State – Impacts – Responses).

According to the study, the daily water consumption of a tourist is roughly 0.27 m³ per overnight stay. The daily electricity consumption due to tourism is currently around 40.4 kWh per overnight stay but there is a risk that this may increase, further accentuating the country's dependence on imported electricity. The estimated production of solid waste due to tourism is 1.99 kg per visitor per day. The estimated wastewater production is 2.2 m³ per visitor per day. Based on these estimates, the water consumption, wastewater generation, electricity consumption and solid waste generation were calculated for the country in total and for particular types of tourist resorts (table 9.5).

Water

The biggest threat to the long-term development of nautical tourism is the uncontrolled use of naturally formed areas and natural resources.

Table 9.5: Tourism and the environment

		2007	2008	2009	2010	2011	2012
Total	Tourist nights, thousands	56,005	57,103	56,300	56,416	60,354	62,743
	Water consumption, million m³	15.1	15.4	15.2	15.2	16.3	16.9
	Wastewater generation, million m³	123.2	125.6	123.9	124.1	132.8	138.0
	Electricity consumption, million kWh	2,262.6	2,307.0	2,274.5	2,279.2	2,438.3	2,534.8
	Solid waste generation, thousand tons	111.4	113.6	112.0	112.3	120.1	124.9
Zagreb	Tourist nights, thousands	1,057	1,102	969	1,007	1,092	1,157
	Water consumption, million m ³	0.3	0.3	0.3	0.3	0.3	0.3
	Wastewater generation, million m ³	2.3	2.4	2.1	2.2	2.4	2.5
	Electricity consumption, million kWh	42.7	44.5	39.1	40.7	44.1	46.7
	Solid waste generation, thousand tons	2.1	2.2	1.9	2.0	2.2	2.3
Bathing resorts	Tourist nights, thousands	435	443	384	363	365	357
	Water consumption, million m ³	0.1	0.1	0.1	0.1	0.1	0.1
	Wastewater generation, million m ³	1.0	1.0	0.8	0.8	0.8	0.8
	Electricity consumption, million kWh	17.6	17.9	15.5	14.7	14.7	14.4
	Solid waste generation, thousand tons	0.9	0.9	0.8	0.7	0.7	0.7
Seaside resorts	Tourist nights, thousands	52,649	53,573	52,911	52,869	56,439	58,102
	Water consumption, million m ³	14.2	14.5	14.3	14.3	15.2	15.7
	Wastewater generation, million m ³	115.8	117.9	116.4	116.3	124.2	127.8
	Electricity consumption, million kWh	2,127.0	2,164.3	2,137.6	2,135.9	2,280.1	2,347.3
	Solid waste generation, thousand tons	104.8	106.6	105.3	105.2	112.3	115.6
Mountain resorts	Tourist nights, thousands	432	444	430	430	448	469
	Water consumption, million m ³	0.1	0.1	0.1	0.1	0.1	0.1
	Wastewater generation, million m ³	1.0	1.0	0.9	0.9	1.0	1.0
	Electricity consumption, million kWh	17.5	17.9	17.4	17.4	18.1	18.9
	Solid waste generation, thousand tons	0.9	0.9	0.9	0.9	0.9	0.9
Other types of tourist resort	Tourist nights, thousands	340	374	351	357	341	362
	Water consumption, million m ³	0.1	0.1	0.1	0.1	0.1	0.1
	Wastewater generation, million m ³	0.7	0.8	0.8	0.8	0.8	0.8
	Electricity consumption, million kWh	13.7	15.1	14.2	14.4	13.8	14.6
	Solid waste generation, thousand tons	0.7	0.7	0.7	0.7	0.7	0.7
Other resorts	Tourist nights, thousands	1,092	1,167	1,255	1,390	1,669	2,297
	Water consumption, million m ³	0.3	0.3	0.3	0.4	0.5	0.6
	Wastewater generation, million m ³	2.4	2.6	2.8	3.1	3.7	5.1
	Electricity consumption, million kWh	44.1	47.1	50.7	56.2	67.4	92.8
	Solid waste generation, thousand tons	2.2	2.3	2.5	2.8	3.3	4.6

Source: ECE Secretariat calculations based on Statistical yearbook, 2012

Implementation regulations oblige nautical ports to operate reception facilities to collect waste products from vessels (foul sewage, oils, communal waste), which, along with compliance to international environmental standards, effectively contributes to environmental protection. No estimates exist of the pressure tourism puts on water resources in Croatia. Data on water consumption by tourists are not collected and subsequently not published in any reports, such as statistical yearbooks. One particular case of water shortages linked to tourism is presented in Box 9.2.

Croatia has some of the highest-quality bathing waters in Europe, according to the 2013 report on bathing water quality in 2012 by the European Environment Agency (EEA) covering the 27 EU member States, Croatia and Switzerland. The report reveals that of 919 coastal bathing sites in Croatia, 876, or 95.3 per cent, have excellent bathing water, 27 have good and sufficient quality, and 3 have poor quality bathing waters, while data from 13 sites was insufficient.

Box 9.2: Water shortages in Croatia

In 2008, at the peak of the tourist season, the coastal regions of Croatia were plagued with water shortages. Rainfall in Dalmatia had been scarce, and the existing water supply systems were not adequate for large settlements, nor capable of handling the growing influx of people. As a result, water rationing was implemented in some areas.

In one district, water use was curtailed from 11 am to 5 pm. Some tourists left since they did not want to pay for an apartment or hotel in which they could not take a shower. To remedy the situation, the army intervened and helped to bring water from other Croatian cities. As a result, the crisis was averted.

As Croatia can expect water shortages each year, the problem needs to be addressed by overhauling the water system.

Source: http://setimes.com/cocoon/setimes/xhtml/en_GB/features/setimes/features/2006/08/01/feature-02

Volume of GHG emissions

No estimates are available of the volume of greenhouse gas emissions from the tourism sector in Croatia. The 2010 Fifth National Communication of Croatia under the United Nations Framework Convention on Climate Change does not contain any particular data for the tourism sector. The Communication includes a greenhouse gas inventory for 1990-2007. The inventory is structured in a conventional way, with sources and sinks of greenhouse gas emissions divided into six main sectors: energy, industrial processes, dissolvent use, agriculture, land-use change and forestry, and waste management. Data on emissions from the tourism sector are largely hidden under the energy and waste management sectors. However, due to the economic importance of tourism and its status as a source of emissions, special attention is being given to this sector in preparations for the low-carbon development strategy.

Air

Most of the energy consumption related to tourism, i.e. about 90 per cent, is required for travel to and from destinations, while the rest of the energy consumption occurs at the destination itself. A close look at energy consumption at destination reveals that the largest share of energy demand is related to accommodation i.e. the hotel industry. The dominant energy form used by hotels is electricity (heating/cooling, lighting, refrigerators and coolers, lifts, escalators), followed by a much smaller share of liquid fuels and natural gas or coal (cooking and water heating).

The Croatian hotel industry follows a pattern whereby the service sector is the second largest consumer of electric energy in the total electric energy demand. The annual occupancy rate varies from 25 to 29 per cent, indicating the seasonality of seaside tourism and its dominance as a tourist profile.

The tourist-resident ratio is 8.4, meaning that, on average, one coastal inhabitant and 8 tourists stay in the same destination at the same time. No estimates are available of air emissions from the tourism sector in Croatia. At the same time, the energy production industry is the main source of air pollution in the country.

*Land*Land taken up by moorings

Croatia has sovereignty over approximately 12.2 per cent of the coastline and 33 per cent of the island coastline in the Mediterranean Sea, which indicates its natural potential for developing nautical tourism. Of the Mediterranean countries, Croatia's share of the overall coastline length, including islands, amounts to about 16 per cent. Its share of nautical vessel moorings in the Mediterranean is about 6.9 per cent, compared to 47.3 per cent for France, 10.4 per cent for Italy, 6.4 per cent for Greece, and 4.9 per cent for Turkey.

With regard to coastline length, Croatia has about 2.7 nautical moorings per kilometre of coastline, while France has 64, Greece 1.1, Italy 3.1, Spain 20.2, and Turkey 2.2. The Croatian share of coastline length is twice as great as its share of the number of moorings. This difference is even more apparent for Greece, where the relationship is 1:5. However, France, Slovenia and Spain, despite small percentages, are in the opposite situation, i.e. a much larger share of moorings than coastline.

County physical plans envisage expanding the existing facilities and constructing new capacities to receive vessels in about 300 potential locations, which is one and a half times more than at present. Expanding and constructing the facilities will involve conducting an analysis of these locations to determine which are the most suitable, and then modifying, amending or providing new county

physical plans for a ten-year period. By 2015, the new physical plans envisage the construction of new capacities in 33,655 locations, of which 25,755 moorings at sea and 7,900 on shore. In the future, according to county physical plans, following the construction of the newly planned capacities, the total capacity for nautical tourism will be 54,675 locations, of which 41,589 at sea and 13,086 on shore.

Waste generation

According to the 2007 Waste Management Plan for 2007-2015, total waste induced from tourism-related activities amounts to 97,700 tons of municipal waste per year. The total tourism waste yield in most counties is not particularly significant in a quantitative sense but its share may be relatively high when taking tourist municipalities or even counties separately. In addition, it is significant that a high quantity of waste is generated only during one particular period of the year, which needs to be taken into account in planning the disposal and management system (box 9.3). Although collection of waste in most communities is organized once a week (and in larger communities two to three times a week) according to a set schedule, in some counties active in the tourism industry waste is collected on a daily basis during the tourist season. Since the waste collection fee is calculated per square metre of household or in terms of the spatial area of hotels and restaurants, it is difficult to provide an exact figure for municipal waste generated, let alone the share of its organic component. Data on municipal waste generated by the tourism sector are hidden in the total data on municipal waste generated in the country (chapter 6). In Croatia, it is prohibited to dispose waste on the islands. The country makes efforts to relocate existing waste and unregulated landfills away from coastal areas and into the so-called waste management centres (chapter 6).

9.4 Legal, policy and institutional framework

Legal framework

Since 1999, the following laws related to tourism activities have been enacted:

- The 2007 Act of the Provision of Tourism Services;
- The 2006 Hospitality and Catering Industry Act;
- The 2008 Tourist Boards and Promotion of Tourism Act;
- The 2008 Tourist Boards Membership Fee Act;

- The 2011 Tourism and other Construction Land Act.

These laws regulate the economic and fiscal aspects of the tourism sector and do not contain any provisions on the environment.

The Ordinance on conditions and methods of maintaining order in ports and in other parts of the internal maritime waters and territorial sea (OG 90/05) among other issues defines waste management in maritime ports. According to the Ordinance, port authorities are responsible for: keeping the coast and sea free from pollution emitted from maritime facilities; clearing the port of debris that endangers navigation safety and pollutes the sea; and organizing the waste management system in maritime ports. The port authorities provide waste reception facilities in the port. The Ordinance also prescribes a procedure for reporting and receiving waste from vessels and cargo residues. All ports open to public traffic and special purpose ports are obliged to develop and apply a plan for receiving and handling waste and cargo residues, and these plans may also be developed on a regional level.

Policy framework

Tourism Development Strategy until 2020

In 2013, Croatia adopted the Tourism Development Strategy running up to 2020, thus setting a clear direction for the country's tourism sector and presenting guidelines for the development of all of its regions. The Ministry of Tourism is already working on implementing the strategy and developing action plans to determine priorities and the dynamics of the process.

The Strategy sets an objective to make the tourism sector more competitive on the international market, and provides clear instructions on how to initiate investments in the sector. It serves as a basis on which to draw funds from the EU, and its main goal is to position Croatia among the top 20 most competitive countries of the world.

According to the Strategy, by 2020 Croatia is expected to be a globally recognizable tourist destination, competitive and attractive for investments, creating employment, sustainably managing the development of its whole territory, fostering a culture of quality, and providing hospitality, safety and a unique variety of authentic content and experiences to its visitors throughout the year.

Box 9.3: Tourism and the environment in Hvar

Tourism has a significant impact on the environment in Hvar. It places a large burden on wastewater services, waste collection and other services provided by the municipality. In the peak season, the ratio of tourists to locals is three to one, creating significant peak loads on wastewater and other facilities. Tourist-related litter is an issue on the island. In addition, other discharges from boats pollute the water and coastline.

It would be wrong to categorize Hvar as heavily polluted, but in the peak season some negative impacts of tourism can reduce the enjoyment of the town and the surrounding area. The likely growth of tourist volume indicates that resources are needed to create an environment in which tourism can develop sustainably.

Source: Sustainable Tourism and Economic Instruments: the case of Hvar, Croatia. In Sustainability of SAP: Development of Economic Instruments for the Sustainable implementation of the Strategic Action Programme to address marine pollution from land-based activities in the Mediterranean (SAP MED).

From 2013 to 2020, a total of €7 billion of new investments are anticipated in the country's tourism sector, and it is set to have 955,000 beds in its commercial accommodation establishments (up 7%).

It should also see around 30,000 new employment opportunities in tourism and supporting industries, 86,000,000 tourist nights (up 43%) and €14.3 billion of tourist spending. A seven per cent increase in the number of beds and a 43 per cent increase in the number of tourist nights will ensure a higher occupancy rate in accommodation facilities.

The Strategy contains 26 priority measures that relate to clearly defining the necessary legislative amendments, action plans for the development of certain tourism products, and the creation of a new strategic marketing plan.

Strategy of Development of Cultural Tourism

In 2003, Croatia adopted the Strategy of Development of Cultural Tourism. The Strategy set targets to achieve the following goals by the end of 2008:

1. Cultural tourism a priority strategic orientation;
2. Critical mass of human resources possessing the knowledge and skills to develop a modern cultural-tourism product;
3. Established culture of partnership, strong organizational structure and a good flow of information;
4. Secured, stable sources of financing to develop cultural-tourism projects;
5. Cultural-tourism products created at local, regional and national level.

In 2008, the first research was carried out on the changes and progress related to the development of the state of cultural tourism in Croatia.

According to the research, the greatest success has been achieved on goals 1 and 4. Goal 3 has been accomplished to a lesser extent. Although a firm organizational structure is in place for carrying out the Strategy, which has proven to be effective in implementing Government incentives and supporting cultural tourism initiatives/ programs/projects, as well as a relatively adequate flow of information, there is still a lack of satisfactory partnership culture.

Inter- and intra-sectoral cooperation among sectors is only declarative, with a lack of cooperation between the State and the private sector. Goals 2 and 5 have been inadequately accomplished. Inadequate levels of human resources possess the knowledge and skills necessary to develop modern cultural-tourism products, due to an inadequate number of staff with expertise in cultural management, and because achieving this goal should be viewed as a constant, continuous process.

Goal 5 can merely be given a passing grade as there is no evidence of an increasing number of examples of established cultural-tourism products at local, regional and national levels, which should have resulted from following implementation of the action plan designed in the Strategy of Development of Cultural Tourism.

Nautical Tourism Development Strategy for 2009-2019

The 2008 Nautical Tourism Development Strategy for 2009-2019 establishes the basic principle of managing nautical tourism development based on sustainable development. The Strategy contains a vision and strategic goals for the further development of nautical tourism in accordance with the principles of sustainable development, as well as an Action Plan

that elaborates measures, activities, carriers and deadlines for the Strategy's implementation for 2009-2019. A strategy implementation report for the period 2009-2012 was not available at the time of review.

Energy Strategy

The 2009 Energy Strategy considers the use of geothermal energy for recreational tourism purposes in Croatia. According to the Strategy, Croatia will follow the European Union Energy Security and Solidarity Action Plan. The Plan envisages a nine per cent decrease in final energy consumption by 2016 through applying energy efficiency measures. A strategy implementation report for 2009-2012 was not available at the time of review.

Heritage in Tourism Programme

The Heritage in Tourism Programme contributed to the development of continental tourism, and from 2005 to 2009 co-financed 595 projects for a total amount of €3,556,057. Ninety-two per cent of the projects were carried out in the continental and coastal hinterland. The implementation of these projects has revived economic activity, such as an increased number of tourist service providers in underdeveloped tourist areas, reconstruction of traditional facilities made possible by the revival of ancient arts and crafts, and new sales channels for domestic products and services.

Many buildings of architectural heritage (folk architecture, mills, and others) have been saved from further deterioration thanks to new tourism activity. Better protection of the natural heritage was achieved through co-financing of educational trails, viewpoints and observation points in protected areas/ regions.

Theme Routes Programme

The 2007 Theme Routes Programme was aimed at improving recognition of Croatia as a diversified tourist country; inspiring travellers/day trippers to take a short break, circular trip, short holiday or combined holiday/summer holiday by visiting continental and Adriatic hinterland destinations; encouraging foreign tourists/ travellers already staying at a famous tourist destination or on circular trip to explore theme routes and less familiar tourist destinations in order to increase consumption; and creating thematically integrated and organized tourist attractions throughout the year by connecting Croatia's natural, cultural and historical heritage. From 2007 to 2009, there were 182 projects within the Programme, which spent €1,371,222 in total.

Original Souvenir Programme

The 2007 Original Souvenir Programme aimed at reviving the production of traditional and artistic crafts, encouraging additional activities (e.g. production of homemade products and souvenirs), confirming values of unique handmade production, encouraging the creation of reproductions, redesigns and new designs of products, and protecting and preserving the heritage of using traditional techniques and materials. From 2007 to 2009, there were 278 projects in total amounting to €704,993.

Institutional framework

Ministry of Tourism

The Ministry of Tourism is the State body responsible for tourism policy, the Tourism Development Strategy, the tourist board system, the accommodation facilities classification, monitorings and analyses of the tourism market, and international cooperation in tourism.

The 2012 budget allotted to the Ministry of Tourism within the State budget was HRK 226.64 million (€30.63 million), which is 0.20 per cent of the overall State budget. The ministerial budget granted the Croatian National Tourist Board HRK 112 million (approximately €15.14 million) for their promotional activities.

Croatian National Tourist Board

The Croatian National Tourist Board is the national tourist organization founded to create and promote Croatian tourism identity at home and abroad, as well as to raise the overall quality of Croatian tourism (<http://business.croatia.hr>). Its mission includes planning and implementing a common strategy and devising its promotion, proposing and performing promotional activities of mutual interest to all tourism subjects in the country and abroad, and raising the overall quality of the range of tourist services on offer in Croatia. The members of the Croatian National Tourist Board comprise the county tourist boards and Zagreb Tourist Board.

Based on the Strategy of Development of Cultural Tourism, the Croatian National Tourist Board established the Office for Cultural Tourism, with the intention of presenting Croatian cultural heritage to tourists in an acceptable and interesting way, and of creating cultural-tourism products. The Office for Cultural Tourism's main task is the systematic encouragement, development, and coordination of development initiatives for cultural-tourism products.

Its basic goals are to: create a meaningful and substantial image of the country as a cultural-tourism destination, foster the satisfaction of existing visitors, stimulate consumption, extend the season and encourage off-season demand, attract new market segments, and stimulate domestic demand. However, its most important task is to foster the creation of cultural-tourism products. For this purpose, each year the Office finances projects and events from a modest budget of about €160,000.

Institute for Tourism

The Institute for Tourism was established in 1959. It is the only scientific public institute in Croatia specializing in research and consultancy services in tourism. With 30 staff, including 20 scientists, the Institute's activities are governed by an integrated approach to tourism development and management, which takes into account the development aspects of a company or a tourist destination, as well as national tourism policies. The Institute for Tourism works together with tourism industry players. The Institute's long-term scientific research projects include:

- Tourism and economic development;
- Spatial, environmental and socio-cultural aspects of tourism.

For the last 50 years, the Institute has regularly published a reputed Croatian academic journal, "Tourism". Since 2000, it has been produced in both a domestic and an international edition (in English). Other publications by the Institute include scientific books and manuals.

Information instruments

The Croatian Portal on Sustainable Tourism (<http://www.odrzivi.turizam.hr/>) provides an entry point for all concerned stakeholders on laws and other regulations, awards, certificates, best practices, knowledge, events, existing resources, and also projects aimed at sustainable tourism development. It additionally provides direct access to the European site, DestiNet, which posts, in English, the most important pieces of information regarding all Croatian stakeholders involved in the project.

Blue Flag

The Blue Flag programme is an exclusive eco-award given to beaches and marinas that meet strict criteria for both water quality and environmental management. The programme is run by the Foundation for Environmental Education. Today,

Blue Flag has become a truly global programme involving an ever-increasing number of countries. The programme promotes sustainable development in freshwater and marine areas. It challenges local authorities and beach operators to achieve high standards in the four categories of: water quality, environmental management, environmental education and safety.

Croatia prides itself on the number and quality of its Blue Flag beaches, which totalled 102 in July 2013, and its marinas, which numbered 18.

9.5 Conclusions and recommendations

No comprehensive information is available on the pressures that tourism puts on the environment in Croatia. Only some sporadic data and indicators are scattered over different institutions and publications. No estimates are available of the pressures that tourism puts on water resources and air in Croatia, nor of the volume of greenhouse gas emissions from the Croatian tourism sector.

The 2010 Fifth National Communication of the Republic of Croatia under the United Nations Framework Convention on Climate Change does not contain any specific data on the tourism sector. Data on municipal waste generated by the tourism sector are hidden within the total data on municipal waste generated in the country.

Recommendation 9.1:

The Ministry of Tourism, together with the Institute of Tourism and in cooperation with the Ministry of Environmental and Nature Protection and the Croatian Bureau of Statistics, should undertake a continuous assessment of the impact from the tourism sector on the environment.

Croatia has a great natural potential for developing nautical tourism. The country possesses approximately 12.2 per cent of the coastline and 33 per cent of the island coastline in the Mediterranean. With regard to coastline length, Croatia has 25 times fewer nautical moorings per kilometre than France and eight times fewer than Spain. County physical plans envisage expanding existing facilities and constructing new capacities to receive vessels in about 300 potential locations, which is one and a half times more than at present.

However, the unsustainable development of nautical tourism could pose threats to naturally formed areas and natural resources and could be one of the biggest threats to the environment in the long-term.

Recommendation 9.2:

The Government should ensure that the necessary environmental protection measures are implemented during the expansion of the existing and construction of new nautical moorings.

Over 90 per cent of tourists come to Croatia for sun and sea. Few tourists come to the country for other types of tourism, such as ecotourism, cultural tourism, thematic tourism and adventure tourism. This confirms the necessity to define, shape and adequately promote these forms of tourism. Continental Croatia, from a tourism point of view,

still remains insufficiently and/or inefficiently exploited, despite multiple potential tourist attractions. To provide for a more dynamic development of tourism in continental areas, an adequate tourism infrastructure needs to be put into place that takes into account environmental considerations.

Recommendation 9.3:

The Government should further promote the development of continental tourism in the country, paying special attention to ecotourism and applying the principles of sustainability.

ANNEXES

Annex I: Implementation of the recommendations in the first review

Annex II: Participation of Croatia in multilateral environmental agreements

Annex III: Key data and indicators available for the review

Annex IV: List of major environment-related legislation

Annex I

IMPLEMENTATION OF THE RECOMMENDATIONS IN THE FIRST REVIEW*

PART I: THE FRAMEWORK FOR ENVIRONMENTAL POLICY AND MANAGEMENT

Chapter 1: Legal instruments and institutional arrangements for environmental protection

Recommendation 1.1:

The organization of environmental protection, physical planning, tourism and water protection, hunting, fisheries and forest protection in a combined ministry should be considered. This ministry should also include an organizational unit to coordinate environmental education projects and raise environmental awareness among the public.

Recommendation was partially implemented. The Ministry of Environmental Protection and Physical Planning was established in 2000 on the basis of the State Directorate for Environment Protection. Currently, responsibilities on environmental management are spread among several ministries: the Ministry of Environmental and Nature Protection for air, waste, nature, soil, sea and coastal areas, the Ministry of Agriculture for water, hunting, fisheries and forestry and the Ministry of Health for genetically modified organisms (GMO), chemicals and noise. Tourism and environment is under competence of the Ministry of Tourism, and the Ministry of Construction and Physical Planning is competent for physical planning.

The Ministry of Environmental and Nature Protection has established the Department for General Environmental Policy, which is coordinating the implementation of the National Action Plan for Education for Sustainable Development. The Intersectoral Coordination for Implementation of the Action Plan for Education for Sustainable Development has been established.

Recommendation 1.2:

The Environmental Protection Law should be revised to meet, inter alia, the requirements of the Aarhus Convention. Improvements in public access to information, public participation and access to justice in accordance with the Convention will also strengthen enforcement mechanisms for environmental protection.

The Aarhus Convention as well as EU directives related to the same topics have been transposed into Croatian legislation by the EPA and by several implementing regulations, such as the Regulation on information and participation of the public and public concerned in environmental matters (OG 64/08), the Regulation on environmental impact assessment (EIA) (OG 64/08), the Regulation on strategic environmental impact assessment (SEA) of the plans and Programmes (OG 64/08), the Regulation on the establishment of the Croatian Environment Agency (OG 75/02) and the Regulation on environmental information system (OG 68/08).

Recommendation 1.3:

The public should receive further information on the EIA procedure, encouraging it as well as NGOs to make use of the public participation procedure. Information about planned developments should be published at an early planning stage to facilitate public participation.

Recommendation was partially implemented. The legal provisions to inform and ensure the participation of the public concerned in the EIA procedure are in place: the 2007 EPA, the Regulation on environmental impact assessment (OG 64/08, 67/09), the Regulation on strategic environmental assessment of plans and programmes (OG 64/08), the Regulation on information and participation of the public and public concerned in

* The first review of Croatia was carried out in 1999. During the second review, progress in the implementation of the recommendations in the first review was assessed by the EPR Team based on information provided by the country.

environmental matters (OG 64/08). However, there is no evidence that these provisions have been implemented.

Recommendation 1.4:

Inspections should be systematically combined as much as possible. This is particularly true for environment and water protection inspections. An environmental inspector should also be appointed in the county of Zagreb.

In 2008, the agreement on cooperation between environment inspection services was signed by the Ministry of Environmental Protection, Physical Planning and Construction, the Ministry of Culture, the Ministry of the Sea, Transport and Infrastructure, the Ministry of Regional Development, Forestry and Water Management, the Ministry of Agriculture, Fisheries and Rural Development, the Ministry of the Interior, the Ministry of Health and Social Welfare, and the State Inspectorate. Based on this agreement, a manual was developed on the implementation of coordinated inspection control in line with recommendations from EU acts on setting minimum criteria for environmental inspections.

Inspection services cooperate by exchanging data which have an impact on environmental protection, and particularly on the preparation and performance of coordinated inspection controls, and by using the services of authorized persons (professional institutions, laboratories, agencies, etc.) for inspections, remediating the consequences of major accidents, and other activities within the scope of international cooperation of inspection services.

Coordinated inspection controls are carried out on the basis of a mutually coordinated annual work plan for the following year, published on the website of the Ministry of Environmental and Nature Protection, as well as a work programme. Joint reports are prepared each year on the coordinated inspection controls performed and on other activities within the framework of joint cooperation.

The Department for Environmental Inspection for the City of Zagreb and Zagreb County with headquarters in Zagreb is established as a branch unit within the Ministry of Environmental and Nature Protection.

Recommendation 1.5:

The level of the fines legally prescribed should be examined and adapted, taking into account the economic situation. The fining procedure should be simplified.

The level of fines stipulated in the current environmental legislation that has applied since 1999 has been increased. The legislation has been changed in the part dealing with penalty provisions. These changes have been made so that penalties can be imposed on natural persons. Now it is possible to impose penalties on individuals and craftsman in an adequate way. Furthermore, judges are allowed to issue minimum penalties and reprimand, and judges may take into account any mitigating circumstances during sentencing, including the financial situation of the accused.

Recommendation 1.6:

Legal provisions should be developed to exempt NGOs from paying taxes and allow donors to deduct their financial contributions to NGOs from their taxable revenues. The SDEP should clearly define its funding policy towards NGOs and improve its transparency.

The 2001 Income Tax Act introduced the possibility for donations for cultural, scientific, educational, health, humanitarian, sports, religious, environmental and other public benefit purposes made to associations and other persons that conduct listed activities in accordance with special regulations, to be deducted from their taxable revenues, if the donations are less than two per cent of donor's income for the previous year (Article 7. paragraph 7, OG 177/04, 90/05, 57/06, 146/08, 80/10, 22/12). This possibility is made both for natural and legal persons. According to the same law, non-profit organizations are not subject to paying profit taxes and the majority of non-profit organizations are not liable to pay value added tax (VAT). Non-profit organizations become subject to value added tax if the value of the sales of goods and services provided, which are not exempt from VAT, exceeds the sum of HRK 85,000 per year.

The Ministry of Environmental and Nature Protection financially supports NGOs working in the environment and nature protection through inviting tenders to finance their projects. The number of programmes and projects financed by the Ministry has increased significantly over recent years (in 1999 - 11, in 2009 - 51).

The Environmental Protection and Energy Efficiency Fund also finances NGO programmes, projects and similar activities determined in accordance with the National Environmental Strategy and the National Environmental Action Plan.

Recommendation 1.7

Periodic and "state-of-the-art" representative opinion polls should be carried out on questions regarding environmental protection, including the general relative ranking of environmental protection among the priorities of the population (nationally, regionally, by age group and socio-economic category of the respondents), and the most pressing specific environmental problems.

There is no information on the implementation of this recommendation.

Chapter 2: Economic and regulatory instruments

Recommendation 2.1:

A time schedule for the full enforcement of all environmental payments should be set and published, including the social conditions that have to be met for the implementation of its steps. Creating an environmental fund with a clear and transparent management is recommended as a measure for improving the funding and efficiency of environmental payments and expenditures during the transition period.

Recommendation was implemented. The Environmental Protection and Energy Efficiency Fund (EPEEF) was established in 2004 in order to secure additional resources for financing programmes and projects on conservation, sustainable use, protection and improvement of the environment and on energy efficiency and use of renewable energy sources. The resources of the Fund are primarily used to finance programmes and projects determined in accordance with the National Environmental Protection Strategy, the Implementation Programme for the Energy Development Strategy and other acts and regulations on environmental protection and energy efficiency.

EPEEF is established as an extra-budgetary fund. The management structure of the Fund consists of the Director and the Management Board. The Director manages operations of the Fund and performs duties as prescribed by the Act on the Environmental Protection and Energy Efficiency Fund and its Statute. The Director is appointed by the Management Board, which comprises two representatives from the Ministry responsible for environmental and nature protection; one representative from the Ministry responsible for energy; one representative from the Ministry responsible for finance; one representative from the Croatian Parliament; one representative from the Croatian Chamber of Economy; and one representative expert on environmental protection. The Management Board adopts the work programme and financial plan for each fiscal year. The Fund also adopts the long-term work programme.

Recommendation 2.2:

The necessary and sufficient economic instruments and their levels should be identified with regard to those measures that are already envisaged in existing legislation.

Resources for financing activities of the Fund are specific-purpose revenues of the Fund from:

- Charges on polluters of the environment are charges for emissions of carbon dioxide (CO₂), sulphur dioxide (SO₂) and nitric dioxide (NO₂). The parties subject to payment of these charges for emissions into the environment are owners and/or users of individual sources of emissions of CO₂, SO₂ or NO₂.
- Charges on environmental users are charges for owners of buildings subject to procedures for assessment of their environmental impact.

Charges for burdening the environment with waste are charges for municipal waste and/or non-hazardous technological (industrial) waste and for hazardous waste. The parties subject to payment of these charges are owners/users of landfills for disposal of municipal and/or non-hazardous technological (industrial) waste. The charge is calculated and paid according to the volume of waste disposed of at the landfill. The charge for

hazardous waste is calculated and paid according to the volume of produced and untreated or non-exported hazardous waste, as well as according to the characteristics of such waste. The charges for burdening the environment with waste are paid for one calendar year.

- Special environmental charges for motor vehicles (special charge) are charges for owners/authorized holders of rights on motor vehicles. The special charge is paid at the time of the registration of the vehicle, i.e. at the time when the vehicle is certified to be roadworthy. The special charge is calculated and paid according to the type of vehicle, type of engine and motor fuel, piston displacement or power-rating of the engine and age of the vehicle.

Recommendation 2.3:

A special mechanism should be designed to help create a market for secondary products. The charges related to industrial waste collection, transport and disposal could be increased, if refunds are introduced at the same time for recycling and reuse.

The Ministry of Environmental and Nature Protection has adopted a number of ordinances which regulate measures and economic instruments used to encourage recycling and reuse of waste for economic purposes. These are:

- Ordinance on Packaging and Packaging Waste;
- Ordinance on Waste Tyre Management;
- Ordinance on the Management of End-of-life Vehicles;
- Ordinance on the Management of Waste Electrical and Electronic Appliances and Equipment;
- Ordinance on Waste Batteries and Accumulators Management;
- Ordinance on Waste Oil Management.

Within its core activities, EPEEF also supports the organization and financing of a system for the management of specific waste streams. Revenues generated by Fund from charges by users of the environment, importers and producers of packaging waste, waste tyres, vehicles, oil, batteries and accumulators and electrical and electronic waste and equipment are used to pay the expenses of collection and recycling of these waste streams to licensed collectors and recovery operators.

Recommendation 2.4:

The statistics on environmental expenditures as well as their sources of funding should be improved as a matter of priority.

Statistics on environmental expenditure has improved and is annually reported in a dedicated section of Croatia's National Statistical Yearbook.

Chapter 3: Environmental consequences of armed conflict

Recommendation 3.1:

The effects of the armed conflict on the environment should be quantified to the maximum possible extent, to become the basis for a comprehensive remediation strategy. Monitoring practices should be widely extended to prepare the strategy.

Recommendation was partially implemented. Cartographic maps have been produced showing suspected hazardous areas by county on the territory of Croatia. Thanks to demining operations conducted by demining companies and general and technical survey operations, the suspected hazardous area has been reduced from an initially estimated 13,000 m² to the now precisely defined 695 km² (on 30 October 2012). The National Mine Action Strategy for the period 2009-2019 defines the prerequisites for solving the mine problem including the capacities and funds needed.

Recommendation 3.2:

Local capabilities should be strengthened to cope with the environmental consequences of the armed conflict on a medium- to long-term basis. Strengthening should involve making finances available as required, including possibly from international assistance.

Recommendation was partially implemented. The central Government and local authorities cooperate in defining the goals of scientific research projects focusing on remediation. Many local and national documents set out how to secure innovative financial resources to address the issue of lands affected by the armed conflict, including land contaminated by mines. There is no evidence that local capabilities to cope with the environmental consequences of the armed conflict have been strengthened.

Recommendation 3.3:

Scientists should evaluate xenobiotic and metabolic processes occurring in underground strata used for the extraction of drinking water, in order to ascertain the microbiological processes that may be causing degradation of chemicals polluting such water. These metabolic processes are of particular importance when such metabolites increase the toxicity of the pollutants. Expertise in anaerobic metabolism will have to be developed.

The network of institutes in Croatia, as part of its regular activities, controls and analyzes drinking water. Over the years, Croatia has developed expertise on analysis of xenobiotics in an aquatic environment by working on scientific research projects co-financed by State funds and international funding. Institutes and universities have also worked on projects concerning anaerobic metabolism.

Recommendation 3.4:

Training in environmental health risk assessment, ecotoxicology and related topics should take place, specifically at regional and local levels. It should be extended to both industrialists and academics.

Courses related to environmental health risk assessment and ecotoxicology are part of the university curriculum. In the meantime, a pollutant release and transfer register (PRTR) has been developed with an interactive application available to the public.

Recommendation 3.5:

Ground contaminated with incompletely burnt pesticides or related products (including PCBs) should be examined and, as necessary, remediation measures proposed, and no new warehouses, production units nor, in particular, any dwellings should be built in those areas.

There is no information on the implementation of this recommendation.

Recommendation 3.6:

Croatia should be invited to actively contribute to the regional assessment of environmental impacts of armed conflicts, in the context of the Stability Pact for South Eastern Europe.

Croatia has actively participated in the activities of the Stability Pact since its establishment in 1999 and, as president of the South-East European Cooperation Process (SEECP) in 2006/2007, played a leading role in the transformation of the Stability Pact into the Regional Cooperation Council. One of the initiatives launched by the Stability Pact in Zagreb was the International Sava River Basin Commission. The International Sava River Basin Commission (ISRBC), headquartered in Zagreb, Croatia, was established to implement the Framework Agreement on the Sava River Basin (signed at Kranjska Gora, Slovenia on 3 December 2002), and implement the mutually agreed goals: establish the international navigation regime on the Sava River and its navigable tributaries; establish sustainable water management and undertake measures to prevent or limit hazards, such as floods, ice hazards, droughts and accidents involving substances hazardous to water; and reduce or eliminate their adverse consequences.

Chapter 4: International cooperation

Recommendation 4.1:

Implementation, compliance and enforcement of environmental norms and action plans following existing international commitments should be a priority for all actors in Croatia's environmental policy. National priorities should be defined for international environmental cooperation, preferably as part of the National Environmental Strategy and the National Environmental Action Plan, which are currently being developed.

National priorities for international environmental cooperation were defined and incorporated in the NES and the NEAP, which were adopted in 2002. The NEAP is currently under revision.

Recommendation 4.2:

An analysis of all existing international cooperation for environmental protection should be undertaken. A strategy for attracting funds involving all governmental bodies related to environmental protection should be developed. The creation of a unit for project management in the State Directorate for Environment should be considered.

Recommendation was partially implemented. For that purpose, the Ministry of Environmental and Nature Protection has established an independent sector for the EU which is, among other things, in charge of coordination of all activities related to the results of the negotiation process for Chapter 27 on the Environment, as well as part of Chapter 22 relating to the Operational Environment Programme for the period 2007-2013. The Sector performs expert and administrative work in coordinating the preparation and implementation of strategic documents and operational programmes for the use of EU funds related to infrastructure projects and technical assistance projects. It is in charge of tasks related to preparing and proposing projects and providing information to final recipients. It performs tasks related to providing financial resources for the implementation of projects, preparing and analyzing the implementation of bilateral agreements for individual projects, and supervises the implementation of strategies, operational programmes and projects. It is responsible for updating the manual for the implementation of operational programmes, and coordinates the programme of all the environmental components of the Operational Programme Environment. There are three units within the Independent Sector: Department for European Integration, Department for Coordination of Operational Programmes, and Department for Project Development and Implementation. However, a strategy for attracting funds involving all Government bodies related to environmental protection has not been developed yet.

Recommendation 4.3:

The State Directorate for the Protection of Nature and the Environment should consider creating a national coordination body which can serve as a forum for information exchange, coordination and cooperation on sustainable development.

The Government has established permanent working bodies that provide it with opinions, suggestions and expert clarifications. All issues related to environmental protection are discussed within the Coordination for Economy working group. This working group includes representatives from all ministries. There are plans to establish an inter-ministerial coordination group to deal with specific issues, consisting of experts nominated on behalf of their ministries.

Recommendation 4.4:

The ratification procedures for the Bern Convention on the Conservation of European Wildlife and Natural Habitats and the Bonn Convention on the Conservation of Migratory Species of Wild Animals should be initiated.

Croatia has been party to the Bern Convention on the Conservation of European Wildlife and Natural Habitats and the Convention on the Conservation of Migratory Species of Wild Animals (CMS) since 2000.

Recommendation 4.5:

Awareness about international environmental conventions and policies and their importance for social and economic issues at the national and regional levels should be raised, with special programmes targeting decision makers as well as the public.

The Ministry of Environmental and Nature Protection regularly publishes information regarding international treaties and projects on its official website.

Recommendation 4.6:

The forthcoming action plan on climate change should include suitable economic instruments in order to support the respective objectives.

Recommendation was partially implemented. The National Strategy for the Implementation of the United Nations Framework Convention on Climate Change and Kyoto Protocol in the Republic of Croatia with the Action Plan was prepared in 2007. Objectives and measures listed in the action plan are an integral part of the 2008 Air Quality Protection and Improvement Plan for the period 2008-2011, OG 61/08. However, there is no evidence that the respective objectives are adequately supported by suitable economic instruments.

PART II: MANAGEMENT OF POLLUTION AND OF NATURAL RESOURCES

Chapter 5: Air management

Recommendation 5.1:

The National Environmental Strategy, the National Environmental Action Plan and the Industry Development Strategy should be drafted in broad collaboration with all those concerned. An implementation strategy taking into account the generally accepted priorities and a realistic assessment of the available resources should be included in the strategic documents. Whenever possible, economic and legislative instruments should support the strategies' implementation.

The 2002 NES and the NEAP were the basis for the development of supporting implementation documents, such as the Strategy for Sustainable Development, the Air Quality Protection and Improvement Plan for 2008-2011, the Plan on reduction of emissions of sulphur dioxide, nitrogen oxides and particulate matter from major combustion plants and gas turbines in the territory of Croatia, the Plan on allocation of greenhouse gas emission quotas in Croatia (National Allocation Plan), and the Programme for gradual emission reduction of certain pollutants up to the end of 2010, with emission projections for the period 2010-2020.

Recommendation 5.2:

Sufficient funds for the county offices and inspectorates should be secured from the county budgets. Priorities should be set on the national level, and their implementation on the local level coordinated systematically. The staff of the offices and inspectorates should be strengthened at least in counties with a high concentration of industry.

Recommendation was partially implemented. County environment inspectorates no longer exist as such. They now come under the competence on the Ministry of Environmental and Nature Protection. The inspection comprises two levels of competence: one central division for the whole country with 20 inspectors, and 5 local branches with 15 offices and 60 inspectors. However, there is no evidence that sufficient funds for inspectorates are secured from the national budget.

Recommendation 5.3:

A detailed concept for a national air quality monitoring network should be established. If appropriate, automatic continuous measuring devices could be used for monitoring traffic-related pollution. The introduction of benzene measurement is essential.

The national network for continuous air quality monitoring consists of 21 monitoring stations, 20 of which were established pursuant to the regulation on siting of national network stations for continuous air quality monitoring, and one station in Slavonski Brod in line with the Air Quality Protection and Improvement Plan for 2008-2011. Air monitoring stations for traffic pollution are located in several cities across the country. Some air monitoring stations also monitor benzene (six monitoring stations at State level).

Recommendation 5.4:

The by-law on the methodology of measuring pollutant emissions from stationary sources into the air should be prepared in collaboration with expert institutions as well as industry, and, prior to its adoption, the cost of applying it should be assessed. For sulphur dioxide, also mass balance estimation should be possible.

Recommendation was implemented. Legislation regarding measurement of pollutant emissions into the air from stationary sources has been constantly harmonized with EU legislation. All stakeholders were included in the drafting of these regulations. Each installation is obliged to measure emissions from stationary sources. The ordinance on monitoring pollutant emissions into the air from stationary sources prescribed, among others, how to measure emissions into the air from stationary sources, the extent and measurement types, reference

measuring methods and sampling. The manual for pollutant emissions into the air, which is based on the Environmental Pollutant Register, sets out the procedure for calculating emissions from stationary sources that do not perform measurements, and for reporting the total annual emissions of pollutants in Croatia.

Recommendation 5.5:

Remedial programmes for particular non-compliance sources should be set up in accordance with local environmental protection documents, with which the local physical plans should comply.

The Air Protection Act (OG 178/04, 60/08) lays down a number of obligations and assigns a significant role to local self-Government units in the implementation of air protection policy. Local self-Government units adopted an action plan for the reduction of air pollution, in order to gradually reach the limit value (LV). They also decided to develop a rehabilitation programme for stationary sources and defined the deadlines for achieving it.

Based on these obligations, rehabilitation programmes and plans of measures were implemented for Sisak - INA Refinery Sisak (H₂S and SO₂), Rijeka - INA Refinery Heated (H₂S and SO₂), Rijeka - Kostrena (PM₁₀), Kutina-factory soot (H₂S) and Zagreb - the western part of the city (PM₁₀). The implementation of the measures prescribed in plans and programmes to protect and improve air quality and reduce emissions of certain pollutants has resulted in significant improvements in air quality (for example, the town of Sisak and Rijeka - SO₂).

Based on the pollution levels set out in the new Air Protection Act (OG 130/11) and given the prescribed limit values (LV), target values and long-term objectives, the following categories of air quality have been determined:

- First category of air quality – clean or negligibly polluted air: the limit values (LV), target values and long-term objectives for ground level ozone have not been exceeded,
- Second category of air quality – polluted air: the limit values (LV), target values and long-term objectives for ground level ozone have been exceeded.

The responsibilities of local self-Government units include implementing specific measures for the protection of human health; establishing air quality monitoring stations if they consider that pollution levels are higher than the prescribed limit; adopting an air quality action plan for the zone and agglomeration in question in order to achieve the limit values or target values as soon as possible; and adopting a short-term action plan in a given zone or agglomeration where there is a risk that the levels of pollutants will exceed the alert thresholds, indicating the measures to be taken in the short term in order to reduce the risk or duration of such an exceedance.

In order to achieve the prescribed obligations, the project "Support to the preparation of a national action plan to reduce particulate matter (PM) and nitrogen oxides (NO_x) in Croatia (Directive 2008/50/EC)" was completed in 2012 as part of the programme between Flanders and Croatia. Under this programme, short-term action plans were drafted for the cities of Sisak, Kutina and Split. The city of Sisak, in accordance with the draft, has started drawing up its own Action Plan.

Recommendation 5.6:

Economic incentives encouraging the purchase of cleaner technologies, abatement techniques, monitoring devices, techniques for the development and use of renewable energy sources, waste recycling, rational energy production/use etc. should be introduced in the taxation and custom system.

Various economic instruments have been adopted to provide economic incentives for environmental improvements. These instruments include charging industrial and energy installations for emissions of SO₂, NO_x and CO₂ into the air, and a special environmental charge for motor vehicles. The Environmental Protection and Energy Efficiency Fund uses these financial resources to finance projects and programmes in environmental protection, renewable sources and energy efficiency.

Recommendation 5.7

Croatia should ratify the VOC Protocol to the Convention of Long-range Transboundary Air Pollution. Croatia should actively prepare for the possible implementation of the new Protocol to Abate Acidification,

Eutrophication and Ground-level Ozone. Its first national communication should be drawn up in broad collaboration with the economic sectors concerned, and realistic baseline emissions negotiated with the responsible international body.

Croatia ratified the VOC Protocol in 2007 and the Gothenburg Protocol in 2008.

Chapter 6: Management of freshwater resources and quality

Recommendation 6.1:

The National Water Council should be revived. It should be representative of Parliament, and involve water management experts and scientists as well as NGOs. It should coordinate its decisions with the Committee of Environmental Protection and Physical Planning in matters regarding waters and environmental protection.

The recommendation was implemented. According to the provisions of the Water Act (OG 153/09, 63/11, 130/11 and 56/13), the National Water Council has been established for the purpose of discussing systematic issues of water management, coordinating needs and interests, and proposing measures for the development and improvement of the water system in Croatia. The National Water Council has a chairperson and 10 members appointed by the Croatian Parliament for a term of four years from among representatives of the Croatian Parliament and distinguished scientists and experts on water management and similar fields. The country followed EU directives, and the structure of the water sector was adapted to apply an integrated water management approach that is suited to Croatia and ensures appropriate participation of all stakeholders at different levels. For the purpose of water management, Croatian Waters established water management departments and branch offices. The water management departments are in charge of implementing the Water Management Plan in their respective river basin district by, among other things, communicating and cooperating with local and regional self-Government, users of water and the water estate, payers of water fees, and users of funds provided by Croatian Waters.

The general public and NGOs were involved in the process of information and public consultation on preparation and adoption of the first RBMP.

The Water Services Council was established to ensure the legality of determining the price of water services. Members of the Council are appointed and suspended by the Parliament upon the proposal of the Government, and are appointed for a term of five years. The Council comprises nine members who are experts on water supply and wastewater sewerage, water management, economy, public finance or other fields.

Recommendation 6.2

Basin water management plans should be urgently completed. Basin agencies should obtain greater autonomy, in particular regarding the spending of the financial resources collected in their basin. Basin committees should be created or their role strengthened in decision-making. These committees should be equally made up of representatives of local territorial authorities, users (or their associations) and the State.

The recommendation has for the most part already been implemented in practice with regard to the development and adoption of the River Basin Management Plan and the Water Management Strategy. The public was involved in both processes. The Decision on the River Basin Management Plan was adopted on 26 June 2013. The integration of environmental and nature protection elements into water management is ensured through performing strategic environmental impact assessments of the river basin management plans, and producing a basic planning document for water management, and other development planning documents (e.g. multiannual construction programs), before the adoption and during the implementation of such documents.

The Danube River and the Adriatic River basin districts were established. Characterization reports have been prepared for both river basin districts, including an analysis of their characteristics, i.e. identification of the natural characteristics of all water bodies, a review of the impact of human activities on the status of waters, and an economic analysis of water use. Based on these, water bodies have been identified as the main units for which the objectives and measures for water management are defined, in accordance with the Water Framework Directive (WFD).

A river basin management plan with a programme of measures makes it possible to coordinate the management of measures to reduce impacts on the aquatic environment and to monitor the way in which human activities impact water through an integrated and comprehensive approach. The objectives of the river basin management plan reflect the objectives of the WFD.

Recommendation 6.3:

The efficient protection of complete river catchments in the karstic area deserves a special protection regime.

Recommendation was implemented. Due to the importance of karst aquifers for the wider region, Croatia implemented the project DIKTAS with its neighbouring countries. The DIKTAS Project (2010-2014) was initiated by the aquifer-sharing states and is a full-size GEF regional project, implemented by UNDP and executed by UNESCO. The project's activities focus on Albania, Bosnia and Herzegovina, Croatia and Montenegro.

The objective of the Project is to introduce sustainable integrated management principles into a transboundary karst freshwater aquifer of the size of the Dinaric Karst System. It is a collective effort to facilitate the equitable and sustainable utilization of the transboundary water resources of the Dinaric Karst Aquifer Systems shared by several countries. Its goal is to protect the unique groundwater dependent ecosystems that characterize the Dinaric Karst region of the Balkan Peninsula. However, the areas intended for the abstraction of water for human consumption (drinking water) are protected by designating sanitary water source protection zones. This is within the competence of appropriate bodies on local or regional level. Decisions to protect such sources pursuant to the Water Act have been reached for most active sources.

The registered sanitary protection zones cover a total of 11,468 km² or 20 per cent of Croatia's territory. Water protection zones cover a larger area in the Adriatic River basin district (5.899 km² or 28% of the RBD area, including 172 km² on the islands) than in the Danube River basin district (5.569 km² or 16% of the RBD area).

Most of the water protection zones are restriction and control zones, accounting for 83 per cent of the total area of the designated water protection zones in the Danube River basin district, and 51 per cent of the total area of the designated water protection zones in the Adriatic River basin district. The procedure for identifying sanitary protection zones is laid down by the Ordinance on defining sanitary water source protection zones (OG 66/11, 47/13). The Ordinance also includes the preparation of reports on the basis of water research works performed, and reserves the area for sanitary protection zones in a physical planning document pursuant to the legislation on physical planning and construction. Once the required conditions are met, the relevant bodies at local or regional level reach a decision identifying a sanitary water source protection zone, under the prescribed procedure and with participation of all interested stakeholders.

In addition, other protected areas have been designated according to the Water Act, *inter alia*, sensitive areas, vulnerable areas, ecological network.

Recommendation 6.4:

Funds collected from charges, or obtained from other sources, and earmarked for water protection at the basin level should be allocated case by case depending on the results of a cost-effectiveness analysis.

The revenue collected from the water protection fee is used for:

- Preparing water protection plans and making arrangements for their implementation;
- Monitoring and identifying water quality and taking measures for its protection;
- Financing the construction of main public sewerage facilities: main sewers, pumping stations, wastewater treatment plants, discharges into a recipient, plants to treat sludge generated in the process of wastewater treatment, and sewerage network facilities.

A representative body of the local self-Government may introduce a development fee when higher investments in water utility facilities are needed for protecting water sources within the sanitary protection zones. The revenue from the development fee is used to construct water utility facilities or to finance their construction. The main criteria for financing individual projects are the following:

- Cost-effective;
- Affordable;

- Feasible;
- Appropriate for the environment;
- Appropriate for nature;
- Full cost recovery.

Recommendation 6.5:

Economic incentives and a command-and-control approach toward industry should be strengthened to encourage (i) the introduction of cleaner technology, and (ii) industrial investments in waste-water treatment units.

Industry pays a water protection fee based on the polluter pays principle, which encourages polluters to introduce cleaner technologies and invest in their own WWTPs to pre-treat their wastewater.

Recommendation 6.6:

Professional training programmes should be set up for operators of waste-water treatment units. Engineers and experts employed in such units should be trained in water management, including all technical and policy-making issues, or adequate measures should be taken to retain chartered or other well qualified staff in these units.

Training for WWTP managers and employees has been significantly improved in recent years in order to achieve cost-efficient and effective plant operation e.g. training centre in Karlovac.

Recommendation 6.7:

Once the Environmental Emission Cadastre will be reliable and complete, it should fully integrate the existing water emissions registers and should be used as a common decision-making tool, in particular in the introduction of an integrated permitting system.

Croatia Waters keeps emission data in the water protection cadastre. This cadastre contains data on water emissions as part of the Water Information System, which is an integral part of the Croatian Environmental Information System hosted by CEA, which is in turn part of the Water Information System of Europe (WISE).

Recommendation 6.8:

The existing monitoring system for waters should be harmonized and improved. The use of automatic monitoring should be increased. Integration and processing of data should be upgraded. The data should be processed and disclosed.

Recommendation was partially implemented. Since 2009, the monitoring plan has been gradually harmonized with the requirements of the EU Water Framework Directive with the aim of: establishing systematic supervision of the status of water and ultimately achieving long-term changes (surveillance monitoring); monitoring the impacts of implementing water protection measures (operational monitoring); and identifying unknown phenomena in the water system (investigative monitoring). Appropriate monitoring of ecotoxicological, biological and hydromorphological indicators is still lacking.

Recommendation 6.9:

Cooperation between Croatia and all countries in the region concerned by transboundary water management and protection should be improved. The status of cooperation with Bosnia and Herzegovina and Yugoslavia should be clarified from the legal point of view, and a technical programme of cooperation should be defined in order to prepare the ground for the necessary international support and investments.

Recommendation was implemented. Multilateral and bilateral cooperation has been established, particularly with neighbouring countries (Hungary, Slovenia, Bosnia and Herzegovina, and Montenegro), and is being further developed with the aim of addressing controversial issues. Negotiations are currently underway on a water management agreement with Serbia.

Chapter 7: Waste management

Recommendation 7.1:

The enforcement of the existing waste legislation should be considered the first priority for waste management. It should be facilitated by clearly committing sufficient resources to the task, including money to train inspectors and other public and private staff involved in waste management.

Recommendation was partially implemented. There is no evidence that the existing waste legislation is properly enforced. Human resources for waste management within the State authorities are slowly but steadily growing. See also Recommendation 7.4

Recommendation 7.2:

A national waste management policy plan –currently under preparation as part of the National Environmental Action Plan - should be implemented, including legal and economic priorities and instruments that actually achieve the intended goals. A subsequent national programme of action for the various sectors should be adopted, making budgetary and other financial commitments. Special attention should be given to financing hazardous waste management.

The 2005 Waste Management Strategy, as a constituent part of the National Environmental Strategy (OG 46/02), includes an evaluation of the present state of waste management, strategic and quantitative goals and measures for achieving those goals, guidelines, investment estimates and sources of funding. The Waste Management Plan for 2007-2015 was adopted in 2007 with the basic task of organizing the implementation of the main goals of the Strategy.

The management of special categories of waste is regulated by ordinances. For six special categories of waste (packaging waste, waste tyres, end-of-life vehicles, waste oils, waste electrical and electronic appliances and equipment, waste batteries and accumulators) these ordinances regulate compensations for collectors and treatment operators. Producers/importers of special categories pay a fee to the Environmental Protection and Energy Efficiency Fund, which is then used to compensate collectors and treatment operators. Since the application of the aforementioned systems began, new treatment and recovery capacities have been put into action. An improvement has been noted in quantities of separately collected waste, thus reducing the pressure on the environment and allowing more rational use of space on landfills. The most significant progress has been noted in waste electrical and electronic systems and end-of-life vehicle systems.

According to the Waste Act, the State is responsible for hazardous waste management. The Ministry of Environmental and Nature Protection issues permits for hazardous waste management. Waste producers must hand over waste to authorized persons in possession of the appropriate permit. The costs of waste management are calculated according to the amount and properties of the waste in accordance with the “polluter pays” principle.

Recommendation 7.3:

The SDEP should consider establishing a small administrative unit to (a) propose streamlining administrative practices in waste management, and (b) facilitate dialogue with and between local waste management authorities. This dialogue should include exchanges on such issues as socially acceptable fees for the collection and disposal of waste.

There is no information on the implementation of this recommendation.

Recommendation 7.4:

Both the Inspectorate and the Waste Register should give particular attention to the import, export and transit of wastes. It is recommended that detailed data on the permits and the actual import, export and transit of wastes, and in particular hazardous wastes, should be made accessible to the public. The permitting and control functions for the import, export and transit of waste should be separated and made transparent.

The Directorate for Environmental Protection and Sustainable Development of the Ministry of Environmental and Nature Protection issues administrative decisions concerning waste imports, hazardous waste exports, non-hazardous waste exports of waste destined for disposal operations, hazardous waste transit, and non-hazardous

waste transit of waste destined for disposal operations. The Directorate for Inspectional Affairs of the Ministry of Environmental and Nature Protection is responsible for inspecting the supervision of the enforcement of the Waste Act and its subordinate legislation. Although in the same Ministry, the two directorates are separate.

Exporters and importers of waste are required to submit yearly reports to the Ministry on the imported/exported amounts and types of waste. The Ministry coordinates data flow with the CEA, which provides data on waste in accordance with the Waste Act and subordinate legislation. The waste management permits register and the transboundary waste movement database are available to the public on the web, as well as yearly reports on various waste management subjects, such as special categories of waste, municipal waste, and transboundary movements of waste.

Recommendation 7.5:

The SDEP should consider assisting municipalities to develop their waste management master plans, by launching a pilot programme in one county for capacity building in municipal waste management and inspection.

Municipalities and towns are responsible for municipal waste management. A few pilot projects on separate waste collection have been launched by municipal companies in their designated areas, and the results of these projects will help identify and improve weak spots in the system. Some towns in Croatia (Krk, Čakovec) already have a successful separate waste collection system in place and should be looked upon as positive examples for other towns/municipalities.

Recommendation 7.6:

A sufficiently complete and reliable waste information system should be developed between all institutions concerned, starting from the completion of the waste cadastre. The public should be informed of possibilities for waste reduction, recycling and similar issues through suitable campaigns.

CEA collects, integrates and provides data on waste. It maintains the Waste Management Information System, develops and sets up indicators used to monitor the state of the waste sector, creates reports on different waste topics, participates in EIONET (European Environment Information and Observation Network), participates in preparing and implementing projects in the waste sector, and provides and facilitates access to information on waste. CEA also informs the public on how to minimize their waste generation and on responsible waste management. In recent years, several campaigns have been launched with the aim of promoting responsible waste management and educating the public (e.g. campaign on the hazards of waste containing asbestos; end-of-life vehicle campaign; electric and electronic waste equipment campaign) but a lot more effort is needed in this area.

Recommendation 7.7:

The adequate elimination of obsolete pharmaceuticals, hazardous industrial chemicals, as well as medical wastes should be seen as the most urgent problem in hazardous waste management, which should be considered the most important part of waste management in general.

The 2007 ordinance on medical waste management establishes methods and procedures for managing medical waste generated by healthcare of people and animals, and in research pertaining thereto. Medical waste must be separately collected, registered and temporarily stored in a special separate area until treatment or delivery to an authorized person possessing the appropriate permit for managing medical waste. Healthcare institutions mostly dispose of their infectious waste by handing it over to authorized persons with treatment/sterilizing appliances or by sterilizing it themselves using their own appliances. After treatment, the remaining waste is deposited on municipal waste landfills. The recovery and disposal of pharmaceutical, cytotoxic, chemical or similar hazardous medical waste is conducted in facilities authorized for the recovery and/or disposal of hazardous waste by incineration.

In 2010, 73.6 per cent of medical waste was sterilized in autoclaves and then sent to landfill. Additionally, 7.89 per cent of non-hazardous medical waste was sent to landfill without prior treatment. A total of 2.93 per cent of medical waste was treated by incineration (waste incineration on land and use of waste principally as a fuel or other means to generate energy). About 5.87 per cent remained stored at the treatment facility, while the rest (9.73%) was exported, mostly for incineration in Austria and Germany. As far as waste hazardous industrial

chemicals are concerned, the producer/holder of the chemicals must hand them over to a person authorized for their collection, recovery and/or disposal.

Chapter 8: Nature conservation, forest and biodiversity management

Recommendation 8.1:

The State Directorate for the Protection of Nature and the Environment should put a higher priority on nature protection, starting with increasing the expert staff in its relevant departments.

The current institutional framework in the nature protection sector is defined by the Nature Protection Act (NPA) (OG 80/13). The Government has recognized a need to strengthen institutional capacity to perform expert tasks of nature protection. In this regard, the State Institute for Nature Protection (SINP) was established in 2002, pursuant to the first National Strategy and Action Plan for the Protection of Biological and Landscape Diversity (OG 81/99). The Institute carries out expert tasks pertaining to: inventory; monitoring; establishment and coordination of the nature protection information system; assessing the state of nature; preparing expert base proposals for the protection of natural values and for inclusion of nature conservation measures into natural resource management plans and physical plans; preparing opinions regarding protected area management plans; developing expert base proposals for the assessment of acceptability of interventions in nature; reporting on the state of nature; participation in the implementation of international agreements on nature protection and organizing and implementing educational and promotional activities in nature protection.

Recommendation 8.2:

An academic advisory committee under the responsibility of the Director of the SDEP should be set up to assist in the decision-making and evaluation processes regarding biodiversity conservation.

Recommendation was partially implemented. With the establishment of the SINP, collaboration with the scientific community improved, at the same time giving momentum to the research and development of scientific data on biodiversity. The SINP actively cooperates with State administration institutions, and also with scientists at universities and institutes, natural history museums, non-governmental organizations, schools and other interest groups.

During first ten years of operation, the SINP has, among other things, carried out tasks such as: establishment of an inventory of species and habitat types for many previously unstudied and poorly known parts of Croatia; development of a system for monitoring individual strictly protected species; development of management plans for the wolf, lynx and endemic freshwater fish species; publication of 25 red books and red lists of threatened plant and animal species; development of the proposed Croatian Ecological network and proposal for the Natura 2000 ecological network; preparation of draft management plans for four potential Natura 2000 areas; development of proposals for the protection of 30 areas; development of expert base proposals for several important pieces of subordinate legislation on nature protection; development of the Report on the State of Nature Protection (2000-2007); active participation in the drafting of the National Strategy and Action Plan for the Protection of Biological and Landscape Diversity from 2008; development of more than 1,300 expert base proposals for including nature conservation measures into natural resource management plans and physical plans; preparation of 700 opinions regarding appropriate assessment; and production of 70 publications for raising public awareness of the need for conservation.

Recommendation 8.3:

The responsibility of the Department for Protected Areas should be increased. In particular, it should oversee the implementation of the management plan more closely.

Recommendation was partially implemented. In 2007, the National Ecological Network was promulgated by a Government regulation. This network consists of ecologically important zones that are divided into areas important for the conservation of wild bird species or wild taxa and habitats. The network of ecologically important areas covers 47 per cent of the land and 39 per cent of the marine part of Croatia (all national parks, nature parks, strict and special reserves, in addition to areas so far not designated under national classification). Since the National Ecological Network is a relatively young conservation mechanism for Croatia, a management framework has still not been established for the whole territory. The most extensive management

system is established in national and nature parks, which have a very long tradition of conservation, specifically through developing management plans for each PA.

Management of protected areas in the categories special reserve, national park, park and regional parks, and protected landscape are established through management plans, which are prepared for a ten-year period. The spatial organization of the national and nature parks is established on the basis of spatial plans. All national parks and nature parks have developed management plans or have prepared an advanced draft plan. A management plan sets out development guidelines, the method of implementing protection, use and management of the protected area, as well as more detailed guidelines for protection and conservation of the natural assets of a protected area, taking into consideration the needs of the local population. MPs are implemented by an annual programme for the protection, conservation, use and promotion of the protected area.

Nature protection and land-use planning management are separated institutionally. The Law on Land-Use Management regulates physical planning and defines the obligation of making regulations on the protection and management of an area of special interest for the State. Nature protection requirements and measures are part of physical planning documents.

Recommendation 8.4:

Biodiversity protection measures should be incorporated into all spheres of human activities, and not only limited to the protection regime provided to certain species and areas. Protection of natural habitats in economically exploited areas should be improved by implementing specific guidelines for nature protection in agriculture, forestry, water management, physical planning and other activities.

The legislative framework for mainstreaming biodiversity into different policies and sectoral documents (e.g. spatial planning, forestry, hunting, agriculture, fishery) is in place and being implemented and will be further enhanced in other sectors.

Management plans for natural resources and physical planning documents (spatial plans) contain nature protection measures and requirements, which include reviews of protected and registered natural assets, ecologically important areas and particularly valuable landscapes, and guidelines for their protection and conservation. In this way, nature is protected in economically exploited areas (i.e. agriculture, forestry, fishing, hunting, construction, transport, energy, exploitation of mineral resources, etc.). With this concept, protection becomes an integral activity that is increasingly adjusted to the concept of sustainable development. Special nature protection requirements enter into the procedure for obtaining a location permit for construction and execution of works and projects in a national park, special nature reserve, natural monument or nature park.

Recommendation 8.5:

Each ecosystem should be used according to its specificity in an ecologically sound manner. The use of the coast for fish farming and marinas should be regulated. Urban sprawl along the coastline should be prevented, new constructions close to existing urban zones streamlined, a coastal strip protected from building and public access to the sea secured.

All projects and activities in ecological network areas that could have a negative impact on the area's conservation objectives are subject to an appropriate ecological network impact assessment, pursuant to the Ordinance on the appropriate assessment of the impact of plans, programmes and projects on the ecological network (OG 118/09). If an activity or a project is subject to an EIA, then this impact assessment is carried out within it.

Croatia has ratified the Barcelona Convention's Protocol on Integrated Coastal Zone Management in the Mediterranean (OG IT 8/12). The Protocol presents legal instruments aimed specifically at managing coastal zones by taking into account the interrelationship between uses of the sea, land and the environment. The EU Marine Strategy Framework Directive was transposed by the Regulation on establishing a framework for Croatia's action in the protection of a marine environment (OG 136/11). The requirements of MSFD call for the development of an integrated marine strategy that applies an ecosystem-based approach to the management of human activities.

Croatian law gives special attention to coastal biodiversity. The 2009 Strategy for Sustainable Development (SSD) focuses specifically on the protection of the Adriatic Sea, coastal area and islands, highlighting the need to reduce the loss of marine and coastal biodiversity. On a legislative level, this goal is reflected in the 2007 Physical Planning and Building Act (PPBA). According to the Act, the protected coastal area, which encompasses all of the islands, the continental belt extending 1,000 m inland from the coastline, and the sea belt extending 300 m out to sea from the coastline, benefits from a specific legal mechanism aimed at ensuring its preservation. PPBA gives special attention to the use of the coast for fish farming and marinas and includes a number of provisions for regional planning. The spatial plan of the county determines in particular the areas intended for hotel, catering and tourism purposes outside a settlement (location, type, maximum capacity and size), and the guidelines for determining detached building areas intended for such purposes. The spatial plan of the county determines in particular the areas intended for nautical tourism ports, golf courses, and areas for mariculture and fishing infrastructure.

New detached building areas outside a settlement that are intended for hotel, catering and tourism purposes may only be established in the spatial plan of a county if existing areas with the same purpose are built on 80 per cent or more of their surface area.

Recommendation 8.6:

Physical planning and its implementation should be based more strongly on joint actions and coordination between the national, county and local administrative levels.

The 2007 Physical Planning and Building Act introduced:

- Principle of Horizontal Integration in Spatial Protection – integrated approach to planning;
- Principle of Vertical Integration and Harmonization of Interests in adopting physical planning documents and other development documents (strategies, plans, programmes etc.). The State and local and regional self-governments are required to mutually cooperate in the spatial planning process, in spatial protection, building and urban regeneration, and in the performance of other activities related to fulfilling physical planning obligations, for the purpose of achieving the objectives of physical planning;
- Harmonized development of physical planning documents.

A physical planning document for the narrower area must be harmonized with the physical planning document for the wider area.

Recommendation 8.7:

Coordination of actions regarding nature protection and biodiversity conservation between the SDEP and other ministries and directorates should be improved. A special unit in the SDEP should be entrusted with the responsibility for coordination.

Recommendation was partially implemented. In 2006, when preparation began of the new strategy on nature protection and biodiversity conservation, ten working groups were established with the aim of analyzing the implementation of the former strategy and determining strategic objectives, guidelines and priority action plans.

These working groups comprised representatives of relevant State administration bodies, professional institutions, public institutions for management of protected areas, inspection services, scientific institutions, the economic sector, and non-governmental organizations. The intention behind involving a wide circle of participants in the preparation of the Strategy was to ensure an integrated approach to the issue of nature protection, thus creating the prerequisites for incorporating biodiversity determinants into all relevant sectors. The draft strategy was made public on the Internet, with the intention of collecting comments, proposals and opinions from the public concerned. A public presentation was made of the draft strategy and the draft Report on the State of Nature and Nature Protection in Croatia. Working groups took all comments into consideration before finalizing the text of individual chapters, objectives, guidelines and action plans. Subsequently, the Ministry submitted the strategy to the competent State administration bodies for comments prior to its submission to the parliamentary procedure.

Recommendation 8.8:

The monitoring of nature should be improved in particular with regard to biodiversity, soil and surface water. An inventory of the state of soil degradation and of the state of natural habitats should be envisaged.

Recommendation was partially implemented. Identification of areas important for the conservation of endangered and rare species and habitat types is underway, together with preparation of the inventory and mapping of the habitats and species relevant to the Natura 2000 network. Work to establish similar monitoring has started for all Natura 2000 species and habitats.

Recommendation 8.9:

Cooperation with neighbouring States on physical planning, biodiversity and water management should be intensified, including data exchange. Croatia should implement the international conventions and agreements relating to nature protection and biodiversity conservation that it has ratified, and it should join the main international ecological and development programmes.

Since 2000, Croatia has ratified 16 MEAs related to biodiversity and is implementing them. During the EU accession process, the NPA was constantly aligned with the provisions of EU nature protection legislation.

Through the EU programme on cross-border cooperation, Croatia obtained funding for joint projects with Bosnia and Herzegovina, Hungary, Italy, Montenegro, Serbia and Slovenia, respectively. Croatia has also received international financial/technical assistance through EU funds, GEF donations and financial assistance from various countries and the World Bank.

Chapter 9: Management of marine resources and pollution**Recommendation 9.1:**

An integrated coastal zone management plan should be prepared and implemented.

Recommendation has not been implemented.

Recommendation 9.2:

Technopoles should be established where medium and small-sized industries can share basic supply and treatment facilities so as to benefit from economies of scale in investment and operating cost.

There is no information on the implementation of this recommendation. Restructuring or consolidation of the water utility sector is planned. Service areas will also be defined, including small- and medium-sized industries that are connected to public sewerage systems.

Recommendation 9.3:

Operation centres should be set up to deal with emergencies and protection of the coastal sea and shoreline, where this is not yet the case.

Regional operational centres have been established in all seven coastal counties to implement the Contingency Plan for Accidental Marine Pollution.

Recommendation 9.4:

A waste management plan should be developed for the islands and the coastal area.

The Waste Management Plan for the period 2007-2015 was adopted in 2007. It covers the waste management system on islands and on the coast. As a result, a separate plan for islands and the coastal area has not been prepared.

Waste management in maritime ports is defined under the Ordinance on conditions and methods of maintaining order in ports and in other parts of the internal maritime waters and territorial sea (OG 90/05). The port authority is responsible for supervising order in ports and in other parts of the internal maritime waters and territorial sea, and especially for keeping the coast and sea clean from pollution emitted from maritime facilities.

Recommendation 9.5:

It should be explored, whether navigation should be routed further away from the islands and the coast and to safer port approaches. Especially cargoes with hazardous substances, oil, etc., should follow special routes. Monitoring should take place in coordination with Italy, Croatia and Slovenia.

In 2003, the International Maritime Organization (IMO) established a mandatory ship reporting system in the Adriatic Sea with the aim of constantly monitoring ships carrying dangerous or polluting substances. In 2004, IMO established a scheme of separate, directed navigation, "North Adriatic", in the entrance to the biggest Croatian, Slovenian and Italian ports in the North Adriatic to reduce the risk of ship collisions, and determined a recommendation to avoid sailing ships close to gas platforms in order to prevent damage.

The Vessel Service Traffic started in January 2011. It uses radar and automatic identification systems for ships to monitor maritime traffic in the Croatian part of the Adriatic in real time, and is constantly ready to react to the dangerous movement of a ship and send it a warning via VHF radio communication system.

Recommendation 9.6:

Croatia's national monitoring programme "Systematic Research of the Adriatic Sea as a Basis for the Sustainable Development of Croatia" should be approved and implemented.

The recommendation has not been implemented. Activities are currently underway to establish a monitoring and observation system for the assessment of the marine environment in the framework of the implementation of the EU Marine Strategy Framework Directive.

Recommendation 9.7:

Any new installation should be allowed to operate only if it is monitored and found to comply with the appropriate pollution control. Old and highly polluting installations should be closed within a relatively short time unless they can be economically retrofitted to environmentally sound conditions.

Recommendation was partially implemented. According to the regulations on spatial planning, construction and protection of the marine environment, all new plants planned for construction must obtain all permits prior to starting operation. Special attention is focused on integrated environmental protection requirements and prevention of sudden events from the treatment of hazardous substances. In the last decade, on the basis of a Government decision, highly contaminated areas of former pollution resulting from the termination of so-called dirty technologies have been cleaned up.

Particular attention is paid to infrastructural facilities on the coast and the coastal belt with the aim of recovery/disposal of wastewater from land, waste management and construction of traffic detours. As the law prohibits the disposal of waste on the islands, efforts have been made to relocate existing waste and unregulated landfills away from coastal areas to the so-called waste management centres.

Recommendation 9.8:

All municipalities and major tourist resorts should have proper sewage treatment and effluent systems. An acceleration of investment in waste-water treatment is needed to counteract the deterioration of inland and coastal water quality. Effective conservation of the coastal water quality depends on success in the protection of complete river catchments in the karstic areas.

According to the Plan of Implementation of Water Utility Directives in Croatia, by the end of 2023 investments in proper sewage treatment and effluent systems will total more than €3.2 billion. The Plan will cover all built-up areas in major tourist resorts on the Adriatic coast with a population of over 10,000 by the end of 2020.

Recommendation 9.9:

Croatia should assess the tourist carrying capacity of its Adriatic region in coordination with the Ministry of Tourism, the Ministry of Physical Planning, Building and Housing, the State Directorate for the Protection of Nature and the Environment, the State Water Directorate and assistance from the Regional Activity Centre of the Priority Action Programme.

The assessment of the tourist-carrying capacity of the Croatian part of the Adriatic Sea area planned by relevant ministries has not been conducted yet.

PART III: ECONOMIC AND SECTORAL INTEGRATION

Chapter 10: Management of selected environmental issues in industry

Recommendation 10.1:

A legal framework promoting the development and implementation of cleaner technologies should be developed in cooperation with the State Directorate for the Protection of Nature and the Environment, the future national cleaner production centre, and other appropriate public and industrial institutions.

Recommendation was partially implemented. The Croatian Centre for Cleaner Production was established in 2000. There is no information on the development of a legal framework regarding cleaner technologies.

Recommendation 10.2:

The State Directorate for the Protection of Nature and the Environment should undertake a large-scale information campaign on available assistance for industrial enterprises in their introduction of cleaner technologies. The promotion of the ISO 9000 and ISO 14000 series in Croatian industry should be a second major objective for the campaign. The campaign should also provide information on relevant demonstration projects for the actual introduction of cleaner technologies and products.

Recommendation was partially implemented. Since 2001, the Eco-Management and Audit Scheme (EMAS) system has been open to all economic sectors in Croatia, including public and private services, and implemented in cooperation with the Ministry of Environmental and Nature Protection. In addition, pursuant to the regulation on product quality control in order to reduce pressure on the environment from industrial activities, standards ISO 9000 and ISO 14000 are being introduced and implemented.

Recommendation 10.3:

The State Directorate for the Protection of Nature and the Environment, in cooperation with other governmental authorities represented in the Commission on the Safe Management of Chemicals, should develop a law for the safe management of chemicals, based on the relevant EU directives and practices. It should also strengthen its coordinating role in the safe management of chemicals.

The Chemicals Act was adopted in 2005 and the National Strategy for Chemical Safety in 2008. Existing legislation in this area is mostly harmonized with EU legislation as well as the relevant MEAs. Particular attention is given to the safe management of chemicals. Control is assured by coordinated inspections and reporting on the safe management of chemicals.

Recommendation 10.4:

The Government, in cooperation with chemical companies, should define and apply economic measures that promote a wider introduction of environmental protection measures in the chemical and petrochemical industries, including both in-process and modern end-of-pipe technologies.

There is no information on the implementation of this recommendation.

Recommendation 10.5:

The development of an information system on industrial pollution should be started in the near future, beginning in the chemical industry. It should primarily focus on monitoring soil and groundwater pollution in the vicinity of refineries and chemical industrial sites.

The Ordinance on Environmental Pollution (OG 35/08) was adopted in 2008. The Pollutant Emission Register is a set of data on the sources, type, quantity, method and places of discharge, transfer and disposal of pollutants and waste into the environment. The main purpose of the Ordinance is to establish a unified register on discharge, transfer and disposal of pollutants and waste into the environment, in the form of publicly available databases on pollutants and discharges of pollutants and waste into the environment (air, soil and water) from a single source.

Recommendation 10.6:

Restructuring and privatization in the energy sector to improve energy efficiency, taking into account national conditions and interests, should be seen as an urgent requirement for energy conservation.

Recommendation was partially implemented. The regulatory framework for implementing the Act on Energy End-Use Efficiency has been terminated. In the Regulation on contracting and implementation of energy services in the public sector, the Government defined the methods for contracting energy services, more detailed obligations of energy service providers and customers, more detailed contents of energy efficiency contracts, and budgetary monitoring of energy services for public sector customers, which will endorse the development of the Energy Service Companies (ESCO) market. There is no information as to whether restructuring and privatization of the energy sector did take place, and if so, whether the result was improved energy efficiency in the energy sector.

Recommendation 10.7:

Government and energy enterprises should undertake further research and development of cleaner coal processes, as well as environmentally sound processes using renewable energy resources.

Coal is used only in one power plant and in a fairly modern facility that was granted all permits and approvals by the competent authorities, including in particular: integrated environmental protection requirements, measures to reduce pollution and risks to the environment, and the prevention of major accidents involving dangerous substances. The coal used is of satisfactory quality to guarantee meeting the combustion criteria to reduce pollution and limits below the limit values for emissions into the air. Regulations on the energy efficiency of plants that use coal are fully harmonized with EU legislation, and current inspectional and process control activities have been intensified in order to avoid any possible contamination. The systems are equipped with modern techniques and technologies for continuous monitoring of pollution parameters. Total investments in the programme of renewable energy sources are envisaged to total around €6.3 billion until 2030.

Chapter 11: Environmental concerns in agriculture and forestry**Recommendation 11.1**

The draft law on soils should be finalized, and a land protection policy should be formulated, adopted and implemented. The management of soil erosion risks should be entrusted to a special administrative entity under the supervision of the State Directorate for the Protection of Nature and the Environment, which is currently responsible for soil protection.

Recommendation was partially implemented. The protection and maintenance of soil are implemented through different legislative instruments, depending on land use, i.e. whether it is agricultural land, forest or construction land. Requirements for the protection of soil for agricultural use are prescribed in the Agricultural Land Act (OG 39/13) and related ordinances. Protection of agricultural land from erosion is prescribed through the Ordinance on agricultural measures (OG 43/10) and the Ordinance on good agricultural and environmental conditions (OG 65/13).

Recommendation 11.2:

Permanent monitoring of soil quality should be established – preferably on the basis of the law on soils proposed above - together with a land information system.

Recommendation has not been implemented. However, the new Act on Agricultural Land (OG 39/13) defines that the Agricultural Land Agency will establish, develop, manage and maintain the information system on agricultural land in Croatia.

Recommendation 11.3:

The existing legislation – Law on Heritage, Law on Cadastre, Law on Agricultural Land – should be harmonized in the framework of general environmental policy, and a new land register should be prepared, so as to improve the economic efficiency in agriculture and encourage privatization.

Recommendation not implemented yet.

Recommendation 11.4:

The finalization of the law on organic farming and its adoption by Parliament should be seen as a priority.

The Act on organic production and labelling of organic products (OG 139/10) was adopted in 2010. Several ordinances for each area of production were adopted, i.e. processing of organic product storage and transport, plant and animal production, control system, labelling of food and feed, aquaculture.

Recommendation 11.5:

Economic incentives and other means should be applied to encourage family farms to turn to various forms of sustainable agriculture and agro- and ecotourism.

Recommendation was partially implemented. According to the Act on State Support in Agriculture and Rural Development (OG 80/13), agricultural producers must take specific measures in order to receive direct payments and rural development support (which includes support for ecological and integrated agricultural production). These measures include protection of the environment, human health, animals and plants, animal welfare and good agricultural and environmental conditions (soil erosion, soil organic matter, soil structure, minimum level of maintenance, water management and protection).

No evidence exists as to whether economic incentives and other means have been applied to encourage family farms to take up various forms of sustainable agriculture and agro- and ecotourism.

Recommendation 11.6:

Developing national guidelines for good agricultural practices should be considered. Farmers should pay particular attention to preventing ground and surface water pollution by nitrates, heavy metals and pesticides and permanent monitoring should be established. The role of extension services should be strengthened in regard to the use of fertilizers and plant protection agents. The use of biological and other environmentally friendly pesticides should be encouraged.

The Ministry for Agriculture together with extension services published a booklet on good agricultural practice in 2009. It contains chapters on measures to protect soil, water, air and animal welfare. The booklet is available to all farmers in Croatia in printed and electronic versions. The Croatian extension service provides farmers with information on their obligations concerning environmental protection and better usage of agro-chemicals on their holdings.

Recommendation 11.7:

Methods should be implemented to reduce water pollution by farm effluents, and to reduce the excessive water use in livestock facilities and the high water content of liquid manure. Systems for the collection of liquid manure and other effluents from major farms need to be built.

Croatia has adopted an action programme for protection of waters against pollution caused by nitrates from agriculture (OG 15/13). The provisions of this programme are obligatory in zones designated as vulnerable according to the Government Decision on designation of vulnerable zones in Croatia (OG 130/12), and recommended to farmers outside vulnerable zones.

The action programme includes measures on good agricultural practice in using fertilisers, information on the periods where using fertilisers is prohibited, obligations on chemical analysis of agricultural soil, obligations on keeping records on fertilization, the maximum amounts of manure allowed per hectare, the ban on fertiliser usage on buffer strips, water-saturated, frozen or snow-covered ground, storage capacities for all forms of manure, and other ways to dispose of manure from farms.

Chapter 12: Environmental concerns in tourism**Recommendation 12.1:**

Guidelines for sustainable tourism addressed to local communities, containing notably a checklist of important elements to take into account in tourism development and practical advice on how to resolve environmental problems in tourism, should be drawn up at the national level according to the principles of local Agenda 21.

Recommendation was partially implemented. Some guidelines for sustainable tourism have been proposed at local and regional level. Some are still in development.

Recommendation 12.2:

The national authorities should adopt legal instruments on protected tourist resources, defining a list of tourist resources and protecting them against other economic activities. The legal instruments should mention environmental requirements that protected tourist resources have to preserve, including the quality of bathing water in accordance with international practice.

Recommendation was partially implemented. The Sustainable Development Strategy defines tourism development in accordance with the criteria of construction, physical planning, carrying capacity and efficient adjustment to the limits and possibilities of protected areas, with the aim of preserving biodiversity, natural and cultural heritage. The Tourism Development Strategy aims, inter alia, to protect all tourism resources in accordance with sustainable development principles. The emphasis is on the touristic enhancement of forests, natural sites and cultural heritage.

Recommendation 12.3:

A permanent committee on sustainable tourism composed of representatives of State, county and local levels, and NGOs should be established. The committee should have permanent scientific staff at its disposal and should take part in international networks on sustainable (tourist) development.

Recommendation has not been implemented. A permanent committee on sustainable tourism composed of representatives from State, county and local levels as well as NGOs has not been set up.

Recommendation 12.4:

The National Strategy of Tourism should include provisions for foreign and domestic investors in the tourism sector dedicating part of their investment to the building or renovation of public environmental protection facilities.

The Tourism Development Strategy includes measures aimed at accelerating investments in the tourism sector, in accordance with sustainable development, touristic enhancement of forests, natural sites and cultural property in accordance with environmental protection and sustainable development principles.

Recommendation 12.5:

At primary and secondary levels of education, courses should be introduced concerning tourism in general and the importance of developing an environmental friendly tourism in Croatia in particular.

Tourism in general has been introduced into the curriculums at primary and secondary schools.

Chapter 13: Human health and the environment

Recommendation 13.1:

An operational plan to implement the National Environmental Health Action Plan should be prepared in close coordination with the National Environmental Action Plan and accepted by the Government. The plan should set priorities, define methods of implementation, and assign responsibilities and resources.

Recommendation was partially implemented. The National Environmental Health Action Plan (NEHAP) was prepared in 1999 and adopted by the Ministry of Health. As no responsibilities and resources were assigned within the NEHAP goals, implementation of the activities in the Plan was linked to strategies and plans other than NEHAP (NEAP, sustainable development, etc.). Many activities were performed, but not directly linked with NEHAP.

Recommendation 13.2:

Collaboration should be clearly improved between the sectors and institutions involved in assessing and managing the health risks due to environmental exposure (administration, public health agencies, research and education).

Recommendation was partially implemented. Some attempts were made to establish interdisciplinary committees at different levels to facilitate interdisciplinary collaboration, but these were inconsistent and not action oriented. Many examples exist of good interdisciplinary cooperation, but these tend to be linked to individuals rather than institutions. Recently, the Ministry of Health has established an interdisciplinary committee on the environment and health whose main goal is to coordinate activities under the responsibility of different institutions and ministries.

Recommendation 13.3:

Existing data on health status should be analysed to gain insight into the geographical differentiation in health and its links with the environment. Geographical, region-specific analysis should be routinely used in health surveillance. The National Institute of Public Health may need additional capacity for this activity.

There is no information on the implementation of this recommendation.

Recommendation 13.4:

Time trends of several health indicators deserve closer scrutiny (e.g. drop in life expectancy at age 65, high mortality due to lung cancer, injuries). It is also necessary to assess to what extent the patterns can be related to environmental factors.

Recommendation was partially implemented. Health indicators are monitored, assessed and investigated continuously, according to financial and workforce capacities. They are also interpreted according to environmental factors.

Recommendation 13.5:

Efforts should be made to reduce the share of deaths with causes classified as “ill-defined conditions”. Especially in a region-specific analysis, the large proportion of such deaths may obscure the spatial and temporal patterns of mortality.

Significant efforts were taken to improve the system of mortality statistics, including employment of medical staff as coroners and their further training. Recently, the share of “ill-defined conditions” was around one per cent.

Recommendation 13.6:

The number of medical consultations caused by intestinal infectious diseases registered by the primary health care system is five times the number of digestive system infectious diseases registered by the communicable disease registry. It should be verified to what extent this difference is caused by the definition of diagnostic criterion applied by each system, or by systematic errors. If the quality of the data collected by the primary health care service is verified, this information can be considered for use in the surveillance of water-related health risks. As with the mortality data, the analysis must include a spatial component.

Although reporting infectious diseases to the epidemiological service is obligatory for first-contact medical doctors, not all of them do so, which explains the underreporting, particularly of mild diseases. Cases reported by primary health care doctors in their work reports can be interpreted only for the use of medical services since cases cannot be distinguished from visits. Recently, the computerization of primary health care has been put in place, although it is not yet terminated in terms of predicted functions, which will significantly improve the situation.

Recommendation 13.7:

National air quality standards for thoracic particles (PM_{10}) should be re-considered and the recommended values may have to be markedly reduced. PM_{10} and $PM_{2.5}$ should be monitored to verify compliance with the standards and to assess the results of actions to reduce pollution and its health impacts.

The national network for continuous air quality monitoring has been established. Every year, CEA publishes an air quality report and a categorization of the air quality for the whole territory of Croatia. Based on these evaluations, action plans and measures for the improvement of air quality are being drafted.

Recommendation 13.8:

The level of population exposure to heavy metals, and in particular the blood lead level in children, should be assessed to verify if the high concentration of some metals in sedimented dust is also a health risk. The assessment should focus, in the first place, on people living in the vicinity of the larger waste sites and in areas with heavy traffic.

Recommendation has not been implemented. There are some studies on population exposure to heavy metals, but none at national level. The NIPH has not yet conducted a survey of blood lead levels in children.

Recommendation 13.9:

A programme should be established to reduce population exposure to radon, if further measurements show that there is a genuine health risk.

Recommendation has not been implemented. No programme is in place to reduce population exposure to radon. Settlements are not highly isolated, since Croatia is subject to a mild continental and Mediterranean climate. The Institute for Medical Research has made some measurements of radon in basement flats in Zagreb.

Recommendation 13.10:

The national system of food contamination control should be improved to ensure more efficient actions on the part of the responsible services and to reduce the risk of food-borne disease.

The food safety system is harmonized with EU *acquis*. The competent authority is the Ministry of Agriculture. The Ministry of Health has some limited jurisdiction in legislation and official control at market level. Risk assessment is in the competence of the Food Agency.

Chapter 14: Environmental concerns in transport**Recommendation 14.1:**

As a matter of priority, environmental factors should be considered in managerial decisions at State level on physical planning and related new transport policies. The State Directorate for the Protection of Nature and the Environment should have a role in the related decision-making process and the public should be involved earlier.

Recommendation 14.2:

Strategic environmental assessment should be established to provide a sound basis for a long-term transport strategy. It should cover all transport modes and include effects like shifts in traffic, changes in the choice of the means of transport and possible traffic-inducing conditions.

Both recommendations were partially implemented. The implementation of recommendations 14.1 and 14.2 is as follows.

The Ministry of Maritime Affairs, Transport and Infrastructure is currently developing the Transport Operational Programme (TOP). The general strategic objective of the TOP is to stimulate rapid economic growth based on market integration and sustainable transport development.

An SEA was carried out for the TOP. The SEA results will be submitted to the Ministry of Environmental and Nature Protection in order to obtain its opinion on the strategic assessment carried out for the Programme, which is necessary for its adoption.

Recommendation 14.3:

The environmental impact assessment of transport infrastructures should be improved.

Recommendation has not been implemented. An environmental impact assessment was carried out for individual transport infrastructure projects. However, there is no proof that the quality of the transport infrastructure EIA has improved.

Recommendation 14.4:

A long-term plan in the transport sector, based on the results of a strategic environmental assessment, should be drawn up. In particular, a strategic plan for the future development of the national transport system should favour electrification of railways and improvement of both public and waterway transport.

Recommendation has not been implemented. However, a transport strategy is being drafted, in accordance with the directives given in the EU document Europe 2020.

Recommendation 14.5:

Environmental pressure from the transport sector should be controlled in particular in urban areas. In this regard, resources should be made available, and available instruments be used, for the following priority tasks:

- *promoting the use of less polluting vehicles and fuels, in particular the use of gaseous fuels in the transport sector both through incentives and by setting up a distribution network over the whole territory*
- *setting up inspection and maintenance programmes to enforce emission control standards*
- *monitoring benzene and particulate matter in urban areas.*
- *phasing out leaded petrol.*

See also recommendation 5.3.

Recommendation was partially implemented. The Regulation on the quality of liquid petroleum fuels (OG 33/11) provides, among other things, limit values for components and characteristics of quality of liquid petroleum fuels. It applies to groups of liquid petroleum fuels used for combustion in internal combustion engines in vessels for navigation on internal waters, territorial seas and seas over which Croatia has sovereign rights. The Regulation stipulates the limit values of sulphur content for marine fuel used in navigation on internal waters, territorial seas and seas over which of Croatia has sovereign rights. The Regulation also stipulates that ships at berth must use marine fuels with a maximum sulphur content of 0.1% m/m.

There are no measures so far to encourage the use of gas as a fuel, but gas taproom coverage in Croatia is satisfactory.

The use of lead as an additive was banned in 2006.

With the entry into force of the Ordinance on the technical inspection of vehicles, ECO testing of exhaust on vehicles driven by gasoline engines started in 2001 and on vehicles driven by a diesel engine in 2002.

*Annex II****PARTICIPATION OF CROATIA IN MULTILATERAL ENVIRONMENTAL AGREEMENTS***

Worldwide agreements		Croatia	
		Date	Status
1958	(GENEVA) Convention on the Continental Shelf	1992*	Su
1958	(GENEVA) Convention on the Territorial Sea and the Contiguous Zone	1992*	Su
1958	(GENEVA) Convention on the High Seas	1992*	Su
1961	(PARIS) International Convention for the Protection of New Varieties of Plants	1999*	Ad
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	1992*	Su
	1997 (VIENNA) Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage		
1968	(LONDON, MOSCOW, WASHINGTON) Treaty on the Non-Proliferation of Nuclear Weapons	1992	Su
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	1991*	Su
1971	(RAMSAR) Convention on Wetlands of International Importance especially as Waterfowl Habitat	1992*	Su
	1982 (PARIS) Amendment		
	1987 (REGINA) Amendments		
1971	(GENEVA) Convention on Protection against Hazards from Benzene	1991*	Su
1971	(LONDON, MOSCOW, WASHINGTON) Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof		
1972	(PARIS) Convention Concerning the Protection of the World Cultural and Natural Heritage	1992*	Su
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1991*	Su
	1996 (LONDON) Protocol		
1972	(LONDON, MOSCOW, WASHINGTON) Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and their Destruction	1993*	Su
1972	(LONDON) International Convention on the International Regulations for Preventing Collisions at Sea	1991*	Su
1972	(GENEVA) International Convention for Safe Containers	1991*	Su
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild Fauna and Flora	2000	Ac
	1979 (BONN) Amendment	2000	At
	1983 (GABORONE) Amendment	2000	At
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)		
	1978 (LONDON) Protocol relating to the International Convention for the Prevention of Pollution from Ships	1991*	Su
	1997 (LONDON) Protocol to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto	2005	Ac
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration	1991*	Su
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	2000	Ra
	1991 (LONDON) Agreement on the Conservation of Bats in Europe	2000	Ra
	1992 (NEW YORK) Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBAMS)		
	1995 (THE HAGUE) African/Eurasian Migratory Waterbird Agreement (AEWA)	2000	Ra
	1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)	2000	Ra
1980	(NEW YORK, VIENNA) Convention on the Physical Protection of Nuclear Material	1992*	Su
1981	(GENEVA) Convention Concerning Occupational Safety and Health and the Working Environment	1994	Ra
1982	(MONTEGO BAY) Convention on the Law of the Sea	1995	Ra
	1994 (NEW YORK) Agreement Related to the Implementation of Part XI of the Convention	1995	Ra
	1995 (NEW YORK) Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	2013	Ac

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Worldwide agreements		Croatia	
		Date	Status
1985	(GENEVA) Convention Concerning Occupational Health Services	1994	Ra
1985	(VIENNA) Convention for the Protection of the Ozone Layer	1992*	Su
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	1992*	Su
	1990 (LONDON) Amendment to Protocol	1993	Ra
	1992 (COPENHAGEN) Amendment to Protocol	1997	Ra
	1997 (MONTREAL) Amendment to Protocol	2000	Ra
	1999 (BEIJING) Amendment to Protocol	2002	Ra
1986	(GENEVA) Convention Concerning Safety in the Use of Asbestos	1991*	Su
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	1992*	Su
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1992*	Su
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1994	Ac
	1995 Ban Amendment		
	1999 (BASEL) Protocol on Liability and Compensation		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation	1998	Ac
1992	(RIO) Convention on Biological Diversity	1996	Ra
	2000 (CARTAGENA) Protocol on Biosafety	2002	Ra
	2010 (NAGOYA) Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization		
1992	(NEW YORK) United Nations Framework Convention on Climate Change	1996	At
	1997 (KYOTO) Protocol	2007	Ra
1993	(ROME) Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas		
1993	(PARIS) Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction	1995	Ra
1994	(VIENNA) Convention on Nuclear Safety	1996	At
1994	(PARIS) Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	2000	At
1997	(NEW YORK) Convention on the Law of the Non-navigational Uses of International Watercourses		
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	1999	Ra
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage		
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2007	Ac
2001	(STOCKHOLM) Convention on Persistent Organic Pollutants	2007	Ra
2001	(LONDON) Convention on Civil Liability for Bunker Oil Pollution Damage	2006	Ac
2004	(LONDON) Convention for the Control and Management of Ships' Ballast Water and Sediments	2010	Ac

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Regional and subregional agreements		Croatia	
		Date	Status
1950	(PARIS) International Convention for the Protection of Birds		
1957	(GENEVA) European Agreement concerning the International Carriage of Dangerous Goods by Road	1992*	Su
1958	(GENEVA) Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts	1994*	Su
1968	(PARIS) European Convention for the Protection of Animals during International Transport	2003	Si
1979	(STRASBOURG) Additional Protocol		
1969	(LONDON) European Convention on the Protection of the Archeological Heritage (revised in 1992)	2004	Ra
1976	(BARCELONA) Convention for Protection against Pollution in the Mediterranean Sea	1992*	Su
1976	(STRASBOURG) European Convention on the Protection of Animals Kept for Farming Purposes	1994*	Su
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats	2000	Ra
1979	(GENEVA) Convention on Long-range Transboundary Air Pollution	1992*	Su
1984	(GENEVA) Protocol - Financing of Co-operative Programme (EMEP)	1992*	Su
1985	(HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%		
1988	(SOFIA) Protocol - Control of Emissions of Nitrogen Oxides	2008	Ac
1991	(GENEVA) Protocol - Volatile Organic Compounds	2008	Ac
1994	(OSLO) Protocol - Further Reduction of Sulphur Emissions	1999	At
1998	(AARHUS) Protocol on Heavy Metals	2007	Ra
1998	(AARHUS) Protocol on Persistent Organic Pollutants	2007	Ra
1999	(GOTHENBURG) Protocol to Abate Acidification, Eutrophication and Ground-level Ozone	2008	Ra
1991	(ESPOO) Convention on Environmental Impact Assessment in a Transboundary Context	1996	Ac
2003	(KIEV) Protocol on Strategic Environmental Assessment	2009	Ra
1992	(HELSINKI) Convention on the Protection and Use of Transboundary Watercourses and International Lakes	1996	Ac
1999	(LONDON) Protocol on Water and Health	2006	Ra
1992	(HELSINKI) Convention on the Transboundary Effects of Industrial Accidents	2000	Ac
2003	(KIEV) Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters		
1993	(OSLO and LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(LISBON) Energy Charter Treaty	1997	Ra
1994	(LISBON) Protocol on Energy Efficiency and Related Aspects	1998	Ra
1998	Amendment to the Trade-Related Provisions of the Energy Charter Treaty		Party
1998	(AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	2007	Ra
2003	(KIEV) Protocol on Pollutant Release and Transfer Registers	2008	Ra
1998	(STRASBOURG) Convention on the Protection of Environment through Criminal Law	1999	Ra
2000	(FLORENCE) European Landscape Convention	2003	Ra

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KEY DATA AND INDICATORS AVAILABLE FOR THE REVIEW

Air pollution	2005	2006	2007	2008	2009	2010	2011	2012
Emissions of SO _x								
- Total (1,000 t)	63.6	59.8	67.3	57.4	59.6	43.0	38.8	..
- by sector (1,000 t)								
Energy production and distribution (1A1)	32.7	30.2	39.0	32.0	36.7	19.7	17.9	..
Industry and industrial processes	2.1	1.9	2.1	2.4	1.8	1.3	1.1	..
Transport	9.3	8.7	9.4	7.7	7.2	3.3	2.8	..
Other	..	..	..	..	..	..	..	..
- per capita (kg/capita)	14.3	13.5	15.2	12.9	13.5	9.7	9.1	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	0.9	0.8	0.9	0.7	0.8	0.6	0.6	..
Emissions of NO _x								
- Total (1,000 t)	81.4	81.6	85.5	83.1	74.9	70.0	66.3	..
- by sector (1,000 t)								
Energy production and distribution (1A1)	12.2	11.3	13.7	11.5	11.5	9.5	9.6	..
Energy use in industry (1A2)	10.1	10.6	11.8	12.7	9.7	10.0	9.4	..
Industry and industrial processes	8.8	9.5	10.0	9.2	7.0	5.8	4.1	..
Transport	35.9	35.9	35.9	35.1	32.3	30.6	29.0	..
- per capita (kg/capita)	18.3	18.4	19.3	18.7	16.9	15.8	15.5	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	1.2	1.1	1.1	1.1	1.1	1.0	1.0	..
Emissions of ammonia NH ₃								
- Total (1,000 t)	40.4	39.8	40.7	38.1	37.0	38.1	36.8	..
- by sector (1,000 t)								
Energy production and distribution (1A1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
Energy use in industry (1A2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
Industry and Industrial processes	3.7	2.6	2.7	2.2	1.6	4.0	2.3	..
Transport	0.4	0.5	0.5	0.5	0.5	0.6	0.6	..
- per capita (kg/capita)	9.1	9.0	9.2	8.6	8.4	8.6	8.6	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	0.6	0.6	0.5	0.5	0.5	0.5	0.5	..

Emissions of total suspended particles (TSP)	2005	2006	2007	2008	2009	2010	2011	2012
- Total (1,000 t)	35.3	33.2	32.6	34.4	31.0	28.3	28.4	..
- by sector (1,000 t)								
Energy	9.5	8.8	9.0	8.0	8.6	8.8	8.9	..
Industry	20.2	18.9	18.2	21.4	17.6	15.2	15.4	..
Transport	4.6	4.3	4.3	4.1	3.8	3.3	3.2	..
- per capita (kg/capita)	7.9	7.5	7.3	7.7	7.0	6.4	6.4	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	0.5	0.5	0.4	0.4	0.4	0.4	0.4	..
Emissions of non-methane volatile organic compounds (NMVOC)								
- Total (1,000 t)	101.7	110.5	114.1	109.3	78.5	77.8	73.1	..
- by sector (1,000 t)								
Energy production and distribution (1A1)	0.3	0.3	0.3	0.3	0.3	0.2	0.3	..
Energy use in industry (1A2)	1.8	1.9	2.0	2.1	1.7	1.6	1.5	..
Industry and Industrial processes	8.7	8.3	6.3	5.9	5.3	5.4	6.0	..
Transport	18.4	17.6	16.4	14.8	13.3	11.5	10.4	..
- per capita (kg/capita)	22.9	24.9	25.7	24.6	17.7	17.6	17.1	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	1.5	1.5	1.5	1.4	1.1	1.1	1.0	..
Emissions of persistent organic pollutants (PCBs, dioxin/furan and PAH)								
- Total (1,000 t)	0.010	0.010	0.009	0.010	0.009	0.011	0.013	..
- by sector (1,000 t)								
Energy	0.009	0.009	0.007	0.008	0.008	0.009	0.011	..
Industry	0.001	0.001	0.001	0.002	0.001	0.002	0.002	..
Transport	0.000	0.000	0.000	0.000	0.000	0.000	0.000	..
Other	..	..	..	..	..	..	..	..
- per capita (kg/capita)	0.002	0.002	0.002	0.002	0.002	0.002	0.003	..
- per unit of GDP (kg/1,000 US\$ (2005) PPP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	..
Emissions of heavy metals								
- Total cadmium (t)	0.600	0.582	0.510	0.464	0.450	0.601	0.577	..
- Total lead (t)	51.164	46.847	43.148	38.627	34.591	29.550	26.585	..
- Total mercury (t)	0.8	0.7	0.8	0.8	0.7	0.8	0.8	..

Climate Change	2005	2006	2007	2008	2009	2010	2011	2012
Greenhouse gas emissions (total of CO ₂ , CH ₄ , N ₂ O, CFC, etc.) expressed in CO ₂ eq.								
- Total aggregated emissions (1,000 t) without LULUCF	30,453.8	30,896.1	32,430.1	31,166.7	29,158.7	28,615.5	28,256.4	..
- Total aggregated emissions (1,000 t) with LULUCF	22,302.4	22,821.4	24,705.8	23,343.2	21,093.0	20,743.8	21,224.7	..
- by sector (1,000 t)								
Energy	..	..	..	..	..	..	..	..
Energy industries	6,801.6	6,649.7	7,760.7	6,726.3	6,392.2	5,904.7	6,275.4	..
Manufacturing industries and construction	4,098.3	4,199.6	4,222.9	4,214.7	3,393.6	3,379.4	3,153.3	..
Transport	5,681.2	5,992.1	6,418.2	6,261.8	6,265.6	6,039.6	5,888.7	..
Other sectors	3,979.1	3,740.8	3,395.6	3,512.9	3,530.6	3,596.2	3,393.0	..
Other	..	..	..	..	..	..	..	..
Fugitive emissions	2,112.2	2,263.1	2,370.1	2,186.9	2,068.6	2,089.3	2,004.9	..
Industry	3,294.5	3,446.1	3,629.3	3,592.4	2,983.5	3,211.2	3,000.1	..
Solvent and other product use	194.8	224.2	246.8	239.3	152.9	152.5	144.2	..
Agriculture	3,477.7	3,497.8	3,445.9	3,430.9	3,314.1	3,193.1	3,318.5	..
Land use, land use change and forestry	-8,151.4	-8,074.6	-7,724.3	-7,823.5	-8,065.6	-7,871.7	-7,031.8	..
Waste	814.4	882.6	940.6	1,001.5	1,057.4	1,049.5	1,078.3	..
Other	..	..	..	..	..	..	..	..
- per capita (t CO ₂ eq/capita)	6.9	7.0	7.3	7.0	6.6	6.5	6.6	..
- per unit of GDP (t CO ₂ eq/1,000 US\$ (2005) PPP)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	..
Total emissions								
- Carbon dioxide (CO ₂) (1,000 t)	23,485.2	23,716.5	24,999.1	23,755.7	21,982.5	21,288.8	20,869.3	..
- Methane (CH ₄) (1,000 t)	3,131.9	3,378.9	3,531.1	3,518.0	3,521.8	3,566.0	3,509.1	..
- Nitrous Oxide (N ₂ O) (1,000 t)	3,489.6	3,421.5	3,480.3	3,456.2	3,210.1	3,279.1	3,392.3	..
- Perfluorocarbons (PFCs) (1,000 t CO ₂ eq.)	n/a	n/a	n/a	n/a	0.2	0.0	0.0	..
- Hydrofluorocarbons (HFCs) (1,000 t CO ₂ eq.)	333.5	365.5	405.9	424.2	435.7	472.3	475.9	..
- Sulfur Hexafluoride (SF ₆) (1,000 t CO ₂ eq.)	13.7	13.6	13.7	12.6	8.4	9.3	9.8	..
Ozone layer	2005	2006	2007	2008	2009	2010	2011	2012
Consumption of ozone-depleting substances (ODS) (t of ODP)	53.9	-32.9	8.1	7.7	5.0	3.4	4.8	3.7

Biodiversity and living resources	2005	2006	2007	2008	2009	2010	2011	2012
Protected areas								
- Total area (ha)	633,431	662,417	662,414	662,414	662,414	662,683	748,667	748,667
- Biosphere reserves (ha)	200,000	200,000	200,000	200,000	200,000	200,000	200,000	595,861
- Strict reserves (ha)	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473
- National parks (ha)	97,666	97,666	97,666	97,666	97,666	97,666	97,666	97,666
- Special reserves (ha)	42,604	42,604	42,604	42,604	42,604	42,604	42,604	42,604
- Nature parks (ha)	400,039	419,622	419,622	419,622	419,622	419,622	419,622	419,622
- Regional parks (ha)	..	..	..	..	..	..	102,792	102,792
- Nature monuments (ha)	229	229	227	227	227	227	227	227
- Significant landscapes/seascapes (ha)	127,399	136,801	136,801	136,801	136,801	137,069	137,357	137,357
- Forest parks (ha)	3,500	3,500	3,500	3,500	3,500	3,500	3,421	3,421
- Horticultural monuments (ha)	861	861	861	861	861	862	859	859
- Wetlands of international importance (ha)	88,610	88,610	88,610	88,610	88,610	88,610	88,610	88,610
- Special avifaunistic protection area (ha)	..	..	..	..	..	..	..	..
- Sites of community interest (ha)	..	..	..	..	..	..	..	..
Area of forest land fund by land category, forest species	..	..	..	..	..	..	..	..
Total area (ha)	..	..	..	..	..	..	..	..
- Total area (% of total land area)	11.2	11.7	11.7	11.7	11.7	11.7	13.2	13.2
of which								
Forest land area (ha)	2,465,249	2,465,249	2,465,249	2,465,249	2,465,249	2,465,249	2,465,249	2,465,249
of which								
Resinous tree forests (ha)	13,631	13,631	13,631	13,631	13,631	13,631	13,631	13,631
Broad-leaved tree forests (ha)	2,451,617	2,451,617	2,451,617	2,451,617	2,451,617	2,451,617	2,451,617	2,451,617
Other land (ha)	3,196,216	3,196,216	3,196,216	3,196,216	3,196,216	3,196,216	3,196,216	3,196,216

Biodiversity and living resources (cont'd)	2005	2006	2007	2008	2009	2010	2011	2012
Share of threatened species (IUCN categories) in total number of species (%):								
- mammals	0.00	6.93	6.93	6.93	6.93	6.93	6.93	6.93
- birds - breeding population	23.08	23.08	23.08	23.08	23.08	21.95	21.95	22.76
- birds - wintering population	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84
- birds - flyway population	2.44	2.44	2.44	2.44	2.44	2.44	2.44	3.90
- fish	0.00	10.46	10.46	14.58	14.31	14.31	14.14	14.14
- reptiles	0.00	10.26	10.26	10.26	9.76	9.76	9.76	17.07
- vascular plants	4.17	4.17	4.17	4.17	3.96	3.96	3.96	3.96
Land resources and soil	2005	2006	2007	2008	2009	2010	2011	2012
Land area (km ²)	56,542	56,542	56,542	56,542	56,542	56,542	56,542	56,542
Agricultural land (ha)	2,796,100	2,789,800	2,784,500	2,779,100	2,773,800	2,767,500	..	..
Built-up and other related area (% of total land area)	4.3	4.4	4.4	4.5	4.5	4.6	..	..
Soil erosion	..	..	..	..	..	..	..	..
- % of total land	..	..	..	..	..	..	..	..
- % of agricultural land	..	..	..	..	..	..	..	..
Total consumption of mineral fertilizers per unit of agricultural land (kg/ha)	156.7	151.3	163.6	178.1	143.6	126.5	..	..
Total consumption of organic fertilizers per unit of agricultural land (kg/ha)	..	..	..	..	..	..	..	..
Total consumption of pesticides per unit of agricultural land (kg/ha)	..	..	..	..	..	..	..	..
Energy	2005	2006	2007	2008	2009	2010	2011	2012
Total final energy consumption (TFC) (Mtoe)	6,340.9	6,449.6	6,476.0	6,612.6	6,354.2	6,349.6	6,190.1	..
- by fuel (Mtoe)								
Solid fuel (Coal etc)	147.2	133.3	153.6	157.8	130.5	152.0	140.5	..
Petroleum products	3,110.2	3,231.0	3,256.3	3,233.1	3,074.8	2,901.9	2,814.2	..
Gas	12,250.0	1,185.8	1,188.1	1,273.3	1,223.0	1,283.4	1,183.7	..
Nuclear	..	..	..	..	..	..	..	..
Renewables	351.8	364.0	327.4	328.1	358.6	397.6	456.1	..
- by sector (Mtoe)								
Industry	1,572.8	1,631.6	1,672.0	1,694.1	1,427.5	1,380.9	1,292.4	..
Transport	1,923.0	2,042.2	2,166.3	2,148.7	2,141.9	2,069.2	2,026.3	..
Agriculture/Forestry	242.1	245.2	245.3	261.0	250.0	244.1	244.3	..
Services	678.3	674.5	672.7	717.1	724.6	765.2	755.2	..
Households	1,924.7	1,856.0	1,719.7	1,791.8	1,810.1	1,890.2	1,871.9	..
Electricity consumption (in GWh)	14,404.8	15,062.3	15,366.0	16,118.6	15,489.4	15,843.5	15,716.3	..
Energy intensity TPES/GDP (PPP) (toe/1,000 US\$ (2005) PPP)	93.1	90.2	86.3	86.3	89.1	91.1	88.9	..

Transportation	2005	2006	2007	2008	2009	2010	2011	2012
Passenger transport demand (million passenger km) ²⁾								
by mode:								
road transport	3,403.0	3,537.0	3,808.0	4,093.0	3,438.0	3,284.0	3,145.0	3,249.0
rail	1,266.0	1,362.0	1,611.0	1,810.0	1,835.0	1,742.0	1,486.0	1,104.0
inland waterways	..	..	..	..	..	..	..	..
air transport (number of passengers)	2,099,000.0	2,148,000.0	2,288,000.0	2,329,000.0	2,053,000.0	1,861,000.0	2,078,000.0	1,961,000.0
Freight transport demand (million ton km) ³⁾								
by mode:								
road	10,244.0	11,096.0	11,429.0	11,042.0	9,429.0	8,780.0	8,926.0	8,649.0
rail	2,835.0	3,305.0	3,574.0	3,312.0	2,641.0	2,618.0	2,438.0	2,332.0
pipelines	1,774.0	1,533.0	1,781.0	1,677.0	1,797.0	1,703.0	1,477.0	1,216.0
inland waterways	119.0	117.0	109.0	843.0	727.0	941.0	692.0	772.0
Number of passenger cars	1,384,699.0	1,435,781.0	1,491,127.0	1,535,280.0	1,532,549.0	1,515,449.0	1,518,278.0	1,445,220.0
Average age of passenger cars	..	..	9.8	9.9	10.3	10.5	10.9	..
Waste	2005	2006	2007	2008	2009	2010	2011	2012
Total waste generation (1,000 t)	3,395.6	4,036.6	4,618.4	3,685.7	3,340.5	3,665.7	3,385.3	..
of which:								
- Hazardous waste (1,000 t)	37.0	43.3	54.2	71.6	51.2	61.2	68.3	..
- Non-hazardous industrial waste (1,000 t)	1,946.4	2,339.2	2,841.0	1,825.8	1,544.1	1,995.1	1,805.3	..
- Municipal waste (1,000 t)	1,412.2	1,654.1	1,723.2	1,788.3	1,745.2	1,609.4	1,511.6	..
of which from households (1,000 m ³)	..	..	..	..	..	..	..	..
Demography and Health	2005	2006	2007	2008	2009	2010	2011	2012
Total population (million inhabitants) ¹⁾	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3
Birth rate (per 1,000)	9.6	9.3	9.4	9.9	10.1	9.8	9.6	9.8
Total fertility rate	1.4	1.4	1.4	1.5	1.5	1.5	1.4	1.5
Mortality rate (per 1,000)	11.7	11.3	11.8	11.8	11.8	11.8	11.9	12.1
Infant mortality rate (deaths/1,000 live births)	5.7	5.2	5.6	4.5	5.3	4.4	4.7	3.6
Female life expectancy at birth (years)	78.8	79.3	79.2	79.6	79.6	79.6	79.9	80.1
Male life expectancy at birth (years)	71.8	72.5	72.3	72.4	72.9	73.5	73.8	73.9
Life expectancy at birth (years)	75.4	75.9	75.8	76.0	76.3	76.6	76.9	77.0
Population ages 0-14 years (% of total)	15.9	15.7	15.5	15.4	15.3	15.2	15.2	15.0
Population ages 15-64 years (% of total)	67.2	67.3	67.3	67.3	67.4	67.6	67.1	67.0
Population 65 or above (% of total)	16.9	17.0	17.2	17.3	17.3	17.2	17.7	18.0
Population with access to safe drinking water, total (%)	99.0	99.0	99.0	99.0	99.0	99.0	99.0	..
- Urban (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	..
- Rural (%)	97.0	97.0	97.0	97.0	97.0	97.0	97.0	..
Population with access to improved sanitation, total (%)	99.0	99.0	99.0	99.0	99.0	99.0	99.0	..
- Urban (%)	99.0	99.0	99.0	99.0	99.0	99.0	99.0	..
- Rural (%)	98.0	98.0	98.0	98.0	98.0	98.0	98.0	..

Macroeconomic context	2005	2006	2007	2008	2009	2010	2011	2012
GDP	266,651.5	291,044.0	318,307.8	343,412.1	328,672.4	323,807.0	330,171.0	330,232.0
- change over previous year (% change over previous year; in 2005 prices and PPPs)	4.3	4.9	5.1	2.1	-6.9	-2.3	0.0	-2.0
- in current prices and PPPs, (million US\$)	68,104.0	74,568.0	82,895.0	89,634.0	84,850.0	81,934.0	84,827.0	87,610.0
- in prices and PPPs of 2005 (million US\$)	68,104.0	71,466.0	75,082.0	76,647.0	71,322.0	69,701.0	69,669.0	68,292.0
Registered unemployment (% of labour force, end of period)	17.8	16.7	14.4	13.5	16.7	18.6	18.6	20.9
Net foreign direct investment (FDI) (million US\$)	1,551.0	3,196.0	4,679.0	4,711.0	2,084.0	574.0	1,469.0	..
Net foreign direct investment (FDI) (as % of GDP)	2.3	4.3	5.6	5.3	2.5	0.7	1.7	..
Cumulative FDI (million US\$)	10,661.0	13,857.0	18,536.0	23,247.0	25,331.0	25,905.0	27,374.0	..
Income distribution and poverty	2005	2006	2007	2008	2009	2010	2011	2012
GDP per capita at current prices and PPPs (US\$)	15,332.0	16,820.0	18,721.0	20,308.0	19,819.0	19,335.0	..	..
Consumer price index (CPI) (% change over the preceding year, annual average)	3.3	3.2	2.9	6.1	2.4	1.1	2.3	3.4
Population below national poverty line	17.5	16.3	17.4	17.4	18.0	20.6 *	21.1	..
- Total (%)	17.5	16.3	17.4	17.4	18.0	20.6 *	21.1	..
- Urban (%)	..	..	..	..	..	..	..	..
- Rural (%)	..	..	..	..	..	..	..	..
Telecommunications	2005	2006	2007	2008	2009	2010	2011	2012
Telephone lines per 100 population	42.4	41.3	41.7	42.5	42.2	42.4	40.1	..
Cellular subscribers per 100 population	82.2	99.1	113.8	103.1	106.0	111.9	116.4	..
Personal computer in use per 100 population	..	..	..	..	..	..	..	..
Internet users per 100 population	33.1	38.0	41.4	50.6	56.3	60.3	70.7	..
Education	2005	2006	2007	2008	2009	2010	2011	2012
Literacy rate (%)	..	..	..	..	..	..	99.2	..
Literacy rate of 15-24 years old, men and women (%)	..	..	..	..	..	99.6	99.7	..
Gender Inequality	2005	2006	2007	2008	2009	2010	2011	2012
Share of women employment in the non-agricultural sector (%)	28.2	27.1	26.6	26.9	26.0	24.6	26.3	28.0
Gender Parity Index in								
- Primary education enrolment (ratio)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
- Secondary education enrolment (ratio)	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0
- Tertiary education enrolment (ratio)	1.2	1.2	1.2	1.3	1.3	1.3	1.3	..

Sources:

Ministry of Environmental and Nature Protection
Croatian Environmental Agency
Croatian Bureau of Statistics

Eurostat statistics (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database)
MDG database: <http://mdgs.un.org/unsd/mdg/>
UNECE statistical database: <http://w3.unece.org/pxweb/>
UNFCCC website: <http://unfccc.int>
World Bank Databank, <http://data.worldbank.org/country/>

*Annex IV****LIST OF MAJOR ENVIRONMENT-RELATED
LEGISLATION***

-
- Act on Financing of Units of Local and Regional Self-Government (OG 117/93, 33/00, 73/00, 59/01, 107/01, 117/01 - correction, 150/02, 147/03, 132/06, 73/08, 25/12);
 - Act on Preschool Education (OG 10/97);
 - Act on Utility Services (OG 26/03);
 - Act on Maritime Domain and Ports (OG 158/03, 141/06);
 - Waste Act (OG 178/04);
 - Maritime Act (OG 181/04);
 - Hunting Act (OG 140/05, 75/09);
 - Forest Act (OG 140/05, 82/06, 129/08, 80/10, 124/10, 25/12, 68/12);
 - Act on Physical Planning and Building (OG 76/07, 38/09, 55/11, 90/11, 50/12);
 - Environmental Protection Act (OG 110/07, 80/113);
 - Act on Education in Primary and Secondary Schools (OG 87/08);
 - Noise Protection Act (OG 30/09, 55/13);
 - General Administrative Procedures Act (OG 47/09);
 - Forest Reproductive Material Act (OG 75/09, 61/11, 56/13);
 - Excise Duties Act (OG 83/09, 111/12);
 - Water Act (OG 153/09, 63/11, 130/11, 56/13);
 - Act on Water Management Financing (OG 153/09, 90/11, included in new Water Act 56/13);
 - Act on Radiological and Nuclear Safety (OG 28/10);
 - Air Protection Act (OG 130/11);
 - Nature Protection Act (OG 80/13);
 - Act on Transboundary Movement and Trade in Wild Species (OG 54/13);
 - Act on Water for Human Consumption (OG 56/13);
 - Act on Implementation of the Regulation (EC) No. 1946/03 on Transboundary Movements of GMOs (OG 81/13);
 - Act on Sustainable Waste Management (OG 94/13);
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- Regulation on the establishment of the Croatian Environment Agency (OG 75/02);
 - Regulation on categories, types and classification of waste with a waste catalogue and list of hazardous waste (OG 50/05, 39/09);
 - Regulation on the criteria, procedure and manner of determining compensation to real estate owners and local self-Government units (OG 59/06, 109/12);
 - Regulation on the supervision of transboundary movement of waste (OG 69/06, 17/07, 39/09);
 - Regulation on technical standards of environmental protection from volatile organic compound emissions by storage of petrol and its distribution (OG 135/06);
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