

# Environmental Performance Reviews

## ICELAND

ENVIRONMENT

© OECD, 2001.

© Software: 1987-1996, Acrobat is a trademark of ADOBE.

All rights reserved. OECD grants you the right to use one copy of this Program for your personal use only. Unauthorised reproduction, lending, hiring, transmission or distribution of any data or software is prohibited. You must treat the Program and associated materials and any elements thereof like any other copyrighted material.

All requests should be made to:

Head of Publications Service,  
OECD Publications Service,  
2, rue André-Pascal,  
75775 Paris Cedex 16, France.

# Environmental Performance Reviews

## ICELAND



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

## ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14th December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

*Publié en français sous le titre :*  
EXAMENS DES PERFORMANCES ENVIRONNEMENTALES  
ISLANDE

© OECD 2001

Permission to reproduce a portion of this work for non-commercial purposes or classroom use should be obtained through the Centre français d'exploitation du droit de copie (CFC), 20, rue des Grands-Augustins, 75006 Paris, France, Tel. (33-1) 44 07 47 70, Fax (33-1) 46 34 67 19, for every country except the United States. In the United States permission should be obtained through the Copyright Clearance Center, Customer Service, (508)750-8400, 222 Rosewood Drive, Danvers, MA 01923 USA, or CCC Online: [www.copyright.com](http://www.copyright.com). All other applications for permission to reproduce or translate all or part of this book should be made to OECD Publications, 2, rue André-Pascal, 75775 Paris Cedex 16, France.

## FOREWORD

The principal aim of the OECD's environmental performance reviews is to help *Member countries improve their individual and collective performances in environmental management*. The primary goals for this programme are:

- to help *individual governments* assess progress;
- to promote a continuous *policy dialogue among Member countries*, through a peer review process; and
- to stimulate *greater accountability* from Member countries' governments towards their public opinion, within developed countries and beyond.

Environmental performance is assessed with regard to the degree of achievement of *domestic objectives and international commitments*. Such objectives and commitments may be broad aims, specific qualitative goals, precise quantitative targets or a commitment to a set of measures to be taken. Assessment of environmental performance is also placed within the context of historical environmental records, the present state of the environment, the physical endowment of the country in natural resources, its economic conditions and demographic trends.

These systematic and independent reviews have been conducted for all Member countries as part of the first cycle of reviews. The OECD is now engaged in the second cycle of reviews directed at *promoting sustainable development*, with emphasis on implementation in domestic and international environmental policy, as well as on the integration of economic, social and environmental decision-making.

The report was peer-reviewed by the Working Party on Environmental Performance (Paris, November 2000). The conclusions and recommendations of the report are approved by the Working Party.

Joke Waller-Hunter  
Director, Environment Directorate

## GENERAL INTRODUCTION

This review of Iceland's environmental performance *examines results* in the light of domestic objectives and international commitments. Three countries assisted particularly with this review: Australia, the Netherlands and Switzerland.

The report is organised in three parts:

- Part I is entitled “Environmental Management” and focuses on implementing environmental policies, water and waste management, as well as land management and the central highlands;
- Part II is entitled “Sustainable Development” and focuses on economy and the environment, environmental/social interface and fisheries;
- Part III is entitled “International Commitments” and focuses on international co-operation.

The OECD extends its most sincere thanks to all those who helped in the course of this review, to the representatives of Member countries to the Working Party on Environmental Performance, and especially to the examining countries (Australia, the Netherlands and Switzerland) and their experts. The OECD is particularly indebted to the Government of Iceland for its co-operation in expediting the provision of information and the organisation of the experts' mission to Iceland, and in facilitating contacts with many individuals both inside and outside administrative and governmental structures of the country.

The OECD Working Party on Environmental Performance conducted the review at its meeting on 6-8 November 2000 and approved its conclusions and recommendations. This report is published under the authority of the Secretary-General of the OECD.

## TABLE OF CONTENTS

<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>15</b>
1. Environmental Management .....	16
Implementing environmental policies .....	16
Water and waste management .....	17
Land management and the central highlands .....	18
2. Towards Sustainable Development .....	19
Economy and the environment .....	19
Environmental/social interface .....	21
Sectoral integration: fisheries .....	22
3. International Co-operation .....	24

### Part I

## ENVIRONMENTAL MANAGEMENT

<b>1. IMPLEMENTING ENVIRONMENTAL POLICIES .....</b>	<b>29</b>
1. Evaluation of Performance .....	29
1.1 Institutional and legal framework .....	29
1.2 Regulatory instruments .....	30
1.3 Economic instruments .....	31
1.4 Other instruments .....	32
2. Focus on Selected Topics .....	34
2.1 Environmental policy objectives .....	34
2.2 Environmental agencies .....	36
2.3 Use of economic instruments .....	37
<b>2. WATER AND WASTE MANAGEMENT .....</b>	<b>39</b>
1. Evaluation of Performance .....	39
1.1 Water quality .....	39
1.2 Waste management .....	43
2. Focus on Selected Topics .....	47
2.1 Cost recovery on sewerage and waste water treatment expenditure .....	47
2.2 Pricing geothermal water and cold water use .....	48
2.3 Producer responsibility: hazardous waste charge .....	50

<b>3. LAND MANAGEMENT AND THE CENTRAL HIGHLANDS</b> .....	51
1. Evaluation of Performance.....	52
1.1 Curbing soil erosion .....	52
1.2 Protecting nature and habitats .....	55
1.3 Conserving the central highlands .....	59
2. Focus on Selected Topics .....	61
2.1 Economic incentives for land reclamation .....	61
2.2 Legal framework regarding the central highlands.....	62
2.3 Pressures from tourism.....	62
2.4 Master plan on hydro and geothermal energy.....	64

## Part II

### SUSTAINABLE DEVELOPMENT

<b>4. ECONOMY AND THE ENVIRONMENT</b> .....	67
1. Evaluation of Performance.....	68
1.1 Sustainable development: decoupling of economic growth from environmental pressure.....	68
1.2 Sustainable consumption and production.....	68
1.3 Sustainable development: institutional integration .....	68
1.4 Sustainable development: market integration .....	74
1.5 Environmental expenditure .....	74
2. Focus on Selected Topics .....	75
2.1 Major economic trends.....	75
2.2 Taxes and subsidies.....	75
2.3 Environmental expenditure and financing .....	80
<b>5. ENVIRONMENTAL/SOCIAL INTERFACE</b> .....	83
1. Evaluation of Performance.....	83
1.1 Environmental justice: distributional issues.....	84
1.2 Environmental democracy: information and participation.....	86
1.3 Environmental education and awareness .....	88
2. Focus on Selected Topics .....	90
2.1 Social context .....	90
2.2 Regional development.....	92
2.3 Local Agenda 21 .....	93



<b>6. SECTORAL INTEGRATION: FISHERIES</b> .....	95
1. Evaluation of Performance.....	95
1.1 Setting objectives.....	96
1.2 Setting catch rules.....	97
1.3 The three pillars of sustainable fisheries.....	98
1.4. International issues.....	100
2. Focus on Selected Topics.....	100
2.1 TAC setting.....	100
2.2 Technical regulations, enforcement and surveillance.....	102
2.3 Concentration of the fleet and fleet efficiency.....	102
2.4 Pollution.....	104

### Part III

## INTERNATIONAL COMMITMENTS

<b>7. INTERNATIONAL CO-OPERATION</b> .....	107
1. Evaluation of Performance.....	107
1.1 Regional issues.....	109
1.2 Marine issues.....	112
1.3 Global issues: climate change.....	113
1.4 Other global issues.....	114
2. Focus on Selected Topics.....	115
2.1 Conservation and sustainable use of whales.....	115
2.2 Climate change.....	116
2.3 Wildlife and nature protection.....	121
2.4 Development aid.....	122

## ANNEXES

I.A Selected environmental data.....	126
I.B Selected economic data.....	128
I.C Selected social data.....	130
II.A Selected multilateral agreements (worldwide).....	132
II.B Selected multilateral agreements (regional).....	136
III. Chronology of selected environmental events (1990-2000).....	141
IV. The physical context.....	145

## LIST OF FIGURES AND TABLES

### Figures

2.1	Population connected to public waste water treatment plants.....	41
2.2	Use of nitrogenous fertilisers .....	43
2.3	Municipal waste generation.....	44
3.1	Fauna and flora .....	56
3.2	Major protected areas .....	58
3.3	Trends in tourism.....	63
4.1	Economic structure and trends .....	76
4.2	Road fuel prices.....	79
5.1	Net internal migration to the capital region.....	93
6.1	Fish catches .....	96
7.1	Air pollutant emissions.....	111
7.2	Energy structure and intensity .....	118
7.3	Official development assistance .....	123
	Map of Iceland .....	147

### Tables

1.1	Environmental legislation.....	35
1.2	Economic instruments .....	38
2.1	Waste generation .....	44
2.2	Waste recycling and disposal .....	45
2.3	Cost recovery from waste water charge in Reykjavik.....	48
2.4	Hot water use in Reykjavik .....	49
2.5	Water prices.....	49
2.6	Hazardous waste fund .....	50
3.1	Soil erosion.....	52
3.2	Numbers of grazing livestock.....	53
3.3	Vegetation cover.....	55
4.1	Energy prices in selected OECD countries .....	71
4.2	Change in GDP, sectoral trends and environmental pressures.....	77
4.3	Environmentally related taxes and subsidies.....	78
4.4	Pollution abatement and control expenditure .....	80

---

4.5	Budget for the environment.....	80
5.1	Social indicators .....	90
5.2	Employment .....	91
5.3	Trends in population distribution .....	92
6.1	Selected Icelandic TACs and catches.....	101
6.2	Evolution in Iceland's fishing fleet .....	103
6.3	CO <sub>2</sub> emissions from fishing.....	104
7.1	GHG emissions in Iceland.....	117
7.2	CO <sub>2</sub> and GHG emissions .....	117
I.A	Selected environmental data.....	126
I.B	Selected economic data .....	128
I.C	Selected social data .....	130
II.A	Selected multilateral agreements (worldwide).....	132
II.B	Selected multilateral agreements (regional) .....	136

## ABBREVIATIONS AND SIGNS

### Abbreviations

ACFM	Advisory Committee on Fisheries Management
CFCs	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DAC	Development Assistance Committee, OECD
EEA	European Economic Area
EEZ	Exclusive economic zone
EFA	Environment and Food Agency
EIA	Environmental impact assessment
EMAS	Eco-Management and Audit Scheme (EU)
EU	European Union
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
GNP	Gross national product
GRT	Gross registered tonnes
HCFCs	Hydrochlorofluorocarbons
ICEIDA	Icelandic International Development Aid Agency
ICES	International Council for the Exploration of the Sea
IPC	Integrated pollution control
ISO	International Organization for Standardization
ITQ	Individual transferable quota
IWC	International Whaling Commission
LA21	Local Agenda 21
NCA	Nature Conservation Agency
NDF	Nordic Development Fund
NEFCO	Nordic Environmental Finance Co-operation
NGO	Non-governmental organisation
ODA	Official development assistance
OSPAR	Convention for the Protection of the Marine Environment of the North-east Atlantic
PAC	Pollution abatement and control
PCBs	Polychlorinated biphenyls

p.e.	population equivalent
POPs	Persistent organic pollutants
PSE	Producer support estimate
RE	Reykjavik Energy
SCS	Soil Conservation Service
TAC	Total allowable catch
UN/ECE	United Nations Economic Commission for Europe
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile organic compound

## Signs

The following signs are used in Figures and Tables:

.. : not available

– : nil or negligible

. : decimal point

## Country Aggregates

OECD Europe: All European Member countries of the OECD, i.e. countries of the European Union plus the Czech Republic, Hungary, Iceland, Norway, Poland, Switzerland and Turkey.

OECD: The countries of OECD Europe plus Australia, Canada, Japan, Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

The sign \* indicates that only western Germany is included.

The sign \*\* indicates that not all countries are included.

## Currency

Monetary unit: króna (ISK)

In 1999, ISK 72 = USD 1.

## Cut-off Date

This report is based on information and data available up to September 2000.

## LIST OF TEAM MEMBERS

Ms. Elisabeth Clément	Expert from reviewing country: Switzerland
Mr. Klaas-Jan Moning	Expert from reviewing country: the Netherlands
Mr. Andrew Ross	Expert from reviewing country: Australia
Mr. Christian Avérous	OECD Secretariat
Mr. Gérard Bonnis	OECD Secretariat
Mr. Carl-Christian Schmidt	OECD Secretariat
Mr. Henri Smets	OECD Secretariat (Consultant)

## CONCLUSIONS AND RECOMMENDATIONS\*

After sluggish growth in the early 1990s, Iceland's economic growth performance since 1994 has been one of the best in the OECD, averaging 4.5% in real terms and bringing Icelandic GDP per capita above the OECD average.

The economy depends heavily on Iceland's rich endowment in *natural resources*: the fishing industry on marine resources, the aluminium and ferrosilicon industry on hydropower and the tourism industry on nature and natural beauty. Fish exports and tourism development thus depend on a high-quality environment and a positive, "green" international image.

As Iceland is more sparsely populated than most other OECD countries, it does not suffer from the same order of pollution problems as many densely populated countries. Some *pollution issues* are nevertheless emerging: reducing pollution loading to water from municipal and agricultural sources, improving waste management, enhancing soil and nature conservation and controlling air emissions from increases in road traffic. These challenges largely reflect insufficient environmental infrastructure, together with changes in consumption patterns associated with recent increases in per capita income.

Concerning *international issues* and commitments, Iceland has a good record in transposing EU directives and in protecting the sea and areas of special natural value, but it needs to make progress in its implementation of these commitments, in reducing greenhouse gas emissions from transport and fisheries, and in development aid.

Thus it is all the more necessary for Iceland to: i) further implement environmental policies and strengthen its environmental infrastructure; ii) better integrate environmental concerns into economic decisions; and iii) reinforce international environmental co-operation. This report examines progress made by Iceland *since the previous OECD environmental performance review* in 1993, and the extent to which Iceland's *domestic objectives and international commitments* are being met, based on environmental effectiveness and economic efficiency criteria. A number of recommendations are put forward that could contribute to strengthening the country's environmental performance.

---

\* Conclusions and Recommendations reviewed and approved by the Working Party on Environmental Performance at its meeting in November 2000.

## 1. Environmental Management

### *Implementing environmental policies*

Since the early 1990s and the first OECD environmental performance review of Iceland, the *Ministry for the Environment* has extended the scope of its responsibilities, among which are now: pollution prevention and control, nature protection, physical planning and meteorology. Staffing of the ministry and of the agencies operating under its auspices has increased. Regional public health inspectorates have been created to facilitate implementation of environmental policies. *Legislation* has been substantially enhanced: both environmental legislation, largely as a result of Iceland's participation in the European Economic Area (EEA), and land-related legislation, providing a framework for managing land resources and the central highlands. Significant progress has also been made in environmental impact assessment (EIA) and physical planning.

Implementing environmental policies, however, has proved difficult in many respects. *Licensing and enforcement*, which are shared between the Environment and Food Agency (EFA) for big firms and municipalities' health inspectorates for smaller ones, are lagging. Transposing EU environmental legislation has absorbed many resources at national level, while the small size of many local communities has complicated enforcement at municipal level, due to limited resources and possible conflicts of interests. *Industry* has only started using voluntary agreements, environmental management and eco-auditing. *Economic instruments* have been introduced

It is *recommended* to:

- pursue efforts towards revising and *implementing environmental legislation*, taking account of Iceland's EEA membership;
- strengthen *environmental licensing and enforcement*, e.g. by strengthening government inspection and environmental management by companies, and by ensuring that inspection fees cover inspection costs;
- define quantified *environmental policy objectives*;
- increase the use of *economic instruments* in pollution prevention and control and in nature conservation;
- stimulate environmental management initiatives by *industry*;
- assure timely implementation of the *physical planning* functions of municipalities.



(e.g. in fisheries and in hazardous waste management), but there is scope to increase their use (e.g. pollution charges, user fees for environmental services). There is a need for quantified *environmental policy objectives*.

### *Water and waste management*

Icelandic inland and coastal waters are generally of *good quality*. Pressures on water quality mostly relate to point sources. *Waste water treatment plants* (primary treatment only) have been or are being built to deal with greater Reykjavik's municipal waste water, in response to Iceland's international commitments in the EEA, and investments are being made in rural areas to combine sewers and build outfalls for disposal at sea. *Cost recovery* on these investments is relatively low, however; prices for water supply are also low by international standards. Volumetric waste water charges might be introduced to cover increasing waste water expenditure. Intensive livestock production units increasingly threaten inland waters, as slurry is not allowed to be disposed of directly at sea; *nutrient management plans* should be introduced for pig farms and, more generally, the impact of agriculture on water quality should be monitored more closely.

In line with national objectives of the early 1990s, good performance has been achieved in recycling *waste* from households (e.g. beverage containers), closing unsatisfactory municipal landfills, introducing a hazardous waste charge (1996, based on producer responsibility) and achieving a high rate of recovery of hazardous waste (mostly waste oil from the fishing fleet and other sources). The intent to extend this experience to other waste streams, especially packaging, end-of-life

It is *recommended* to:

- continue investing in *waste water infrastructure*;
- apply the user pays principle in *pricing for waste water services* to households and industry, e.g. through volumetric pricing;
- introduce nutrient management plans at farm level for *intensive pig and poultry production*;
- adopt, as soon as possible, comprehensive *waste management legislation*;
- extend *producer responsibility* to packaging waste, end-of-life vehicles and old tyres;
- complete licensing of all landfills and incinerators as soon as possible, charge for *landfill waste disposal* and continue to develop modern municipal waste treatment.

vehicles and old tyres, has been expressed. However, there is a need to promote cost recovery in municipal waste management, to better finance waste management services and to provide appropriate incentives. Most municipal waste still goes to landfill. A waste management bill is being drafted and municipalities are preparing or implementing regional waste management plans. There is a potential for increased private sector participation and investment in waste management.

### *Land management and the central highlands*

Concerning *soil erosion*, Iceland has implemented projects to halt erosion in many of the most severely affected areas. Sheep grazing has declined as agricultural policy and shrinking markets for mutton and lamb have resulted in a halving of the number of sheep since 1980. Incentives have been provided to farmers to engage in land reclamation and afforestation. Information programmes on soil conservation and range management have been put in place. Concerning *nature conservation*, much progress has been made recently in establishing a legal and institutional base; government support to drain wetlands has ceased. In recent years, a legal framework has been put in place to assure the *sustainable development of the central highlands* (e.g. by specifying municipal boundaries, defining land ownership and related rights, planning infrastructure and conserving nature) and a regional plan has been adopted for the highlands, dealing with: protected areas; traditional uses such as grazing, fishing and hunting; energy resources; tourism and recreation; roads; and sanitation. A national master plan for hydro and geothermal resources is in preparation.

However, large areas of the country remain vulnerable to further *erosion* and overgrazing, and pressure from horse grazing has increased in the lowlands. There is a need to quantify policy objectives in soil conservation and to introduce new measures to enhance the role of local stakeholders. Concerning both *nature conservation and the management of the central highlands*, the legal framework and policies adopted need to be implemented. Most newly protected areas are small; larger wilderness areas and landscapes should be protected, a concern addressed by the 1999 Nature Conservation Act. Ranger staff and management plans are insufficient or lacking in most national parks and other protected areas. Red lists have been issued for birds and vascular plants and should be developed for other species. *Tourism* greatly increased in the 1990s and with it the need to manage the pressures it puts on nature, as well as to finance additional facilities and rangers at the most popular natural sites. The *central highlands* should benefit from the current process of defining land ownership by 2007 and from planning efforts such as the regional plan for the highlands, municipal and local plans, and master plans for energy resources and tourism.

It is *recommended* to:

- streamline soil conservation policy objectives by defining *quantitative targets for sustainable land use, soil reclamation and vegetation cover*;
- regulate *livestock density* based on the carrying capacity of soils, as defined by the Soil Conservation Service, for both sheep and horses;
- follow up on the 1997 survey of *soil erosion* by identifying the various pressures and potential policy responses;
- continue to implement the new legal framework and regional plan for the *central highlands* and increase the responsibility of local stakeholders in land reclamation by clarifying communal and individual *land ownership and user rights* in the highlands;
- extend *protected areas* significantly as regards wilderness and landscape protection (e.g. in the central highlands and coastal areas); prepare and implement *management plans* in all national parks, and extend red lists to cover all relevant species in Iceland;
- increase ranger staff and funding for *nature conservation*, e.g. by applying the user pays principle to the tourism sector, inter alia, through fees and levies on visitors to protected areas;
- diversify farm income by promoting *agro-tourism* and farm forestry.

## 2. Towards Sustainable Development

### *Economy and the environment*

Iceland's economy relies heavily on *natural resources*; the fishing industry depends on marine resources, industry on hydropower, and tourism on nature and related resources. Iceland has achieved a high rate of economic growth in recent years. Some weak *decoupling* of economic growth from environmental pressure is occurring; for example, energy intensity has fallen since 1990, and SO<sub>x</sub> and NO<sub>x</sub> emissions are growing more slowly than GDP. There has also been a degree of progress on pollution management. Some environmentally favourable changes in *consumption patterns* have been induced, notably the switch from oil to geothermal energy for domestic heating. Iceland has also made progress towards sustainable management of natural resources. Framework conditions (e.g. regarding land ownership rights, municipality boundaries, procedures for planning and building infrastructure, and

regional long-term planning) have been established to assure better use and protection of the natural resources of the *central highlands*. The *fishery management system* (individual transferable quotas coupled with better regulations) has enabled fish stocks to recover and produce good economic returns. The National Environmental Strategy, “*Towards Sustainable Development*”, was published in 1993, followed by the National Sustainable Development Action Plan in 1997. The Ministry for the Environment has begun regular co-ordination meetings with several other ministries, local authorities and other stakeholders.

However, *implementation* of the sustainable development strategy and action plan has been patchy. Most ministries and local governments continue to give much more attention to economic considerations, and *integration of environmental factors* in sectoral and economic policies is limited. In some sectors, such as transport and tourism, environmental pressures are increasing and more coherent strategies are needed to address them. Iceland would benefit from improvements in *sustainable natural resource management*, further strengthening of the fishery management system and further reduction of farm support. The *environmental management* industry remains weak. The government is not promoting reduced energy and material intensity in industry, and the implementation of its “green government” policy is patchy. *Taxation policy* has been developed without taking full account of environmental issues, and use of *economic instruments* for environmental policy is limited. While EEA membership and EU environmental directives constitute a major driver for

It is *recommended* to:

- translate national sustainable development commitments into *integrated policies and programmes* in key economic sectors (e.g. fisheries, agriculture, energy, transport and tourism), with targets and timetables;
- further implement mechanisms to encourage *better interministerial co-ordination and co-operation* related to sustainable development;
- review the environmental effects of the *tax system*, integrate environmental concerns in fiscal policies and expand the use of economic instruments for environmental management;
- further increase public and private *environmental expenditure* so as to expand environmental infrastructure, implement national laws and translate international commitments into reality;
- encourage private companies to improve *environmental management standards*, and implement “Environment Policy in Government Operations”.

environmental policy improvements in Iceland, their translation and adoption into Icelandic legislation has dominated administrative attention, and their implementation has just started. *Environmental expenditure* remains low.

### *Environmental/social interface*

In line with a very long *democratic tradition*, Iceland has developed its environmental policies in consultation with relevant stakeholders. The 1997 National Sustainable Development Action Plan was drawn up *with participation of all relevant societal groups*, and a Local Agenda 21 process has been started in co-operation with the public. For the many environmental issues, institutions have been created for complaint and appeal: everyone has the right to go to court in environmental matters, though little use has been made of this possibility so far. However, since Rio, only one comprehensive state of the environment report has been published. *Environmental information* (environmental data, indicators and state of the environment reports) should be issued regularly to inform the public about the environment and give an accounting of the country's performance with respect to its own environmental objectives and commitments.

Much emphasis is given to the role of *environmental education* in sustainable development. By 2000, environment had been made part of the curricula for all levels of education (pre-school, compulsory primary and lower secondary, upper secondary, university), and implementation of this decision has started. *Public environmental awareness* was last measured in 1993. More regular national surveys of environmental awareness and public priorities are needed. The ways in which the public can contribute to sustainable development need to be further clarified and promoted. *Consumption patterns* are influenced by environmental information and awareness, as well as by price signals. A recent tax measure for the largest cars has given wrong signals to the public in the form of reduced incentives for fuel economy. Charges relating to water and waste only partly cover costs.

Available information does not indicate any "*environmental injustice*" with regard to exposure to pollution. The government's policy is to strengthen *regional development* so as to promote population growth outside the Reykjavik area. Through enhanced co-operation with local authorities and among communities, measures are taken to adjust regional development to changing economic circumstances in accordance with principles and objectives of sustainable development. A more integrated approach to industrial policy, regional development and environmental issues could prove useful, however. The effects of the *fishery management system* on regional development and income distribution are under active discussion;

efforts should be made to enable the fishery management system to better address its social objectives.

Iceland has a high rate of volcanic and seismic activity and experiences landslides and avalanches. *Preparedness and mitigation measures* for natural disasters and environmental emergencies have been implemented. Considerable effort has been made in this field.

It is *recommended* to:

- improve public *access to environmental information* by publishing periodic *state of the environment reports*, environmental data and indicators showing the progress made towards goals and targets;
- regularly carry out national surveys of public *environmental awareness*, and build consensus about environmental policies and their implementation;
- develop the use of environmental information and economic instruments to provide appropriate *signals to consumers*;
- further research the *social consequences of the fishery management system* and develop the decision making process so as to achieve the social objectives of sustainable fishery management;
- adopt a new *national plan for sustainable development*, with economic, environmental, social and regional dimensions, a long-term perspective and appropriate objectives and targets, based on extensive consultation;
- adopt a *national spatial plan on land use*, co-ordinated with the sustainable development plan.

### *Sectoral integration: fisheries*

Icelandic fishery management in the past decade is a *success story*, as *fish stocks* have recovered and produced good *economic returns* for large segments of the fleet. Icelandic fishery management authorities have greatly improved the regulatory base, with *total allowable catch* (TAC) and related rules (no discard, gear rules, closure of fishing grounds). Since the introduction of the cod catch rule in 1995, stakeholders know the rules of the game, and pressure to increase TACs above what the scientific advice prescribes have ceased. The *individual transferable quota* (ITQ) system has had positive effects on the fishing industry: most stakeholders in the industry have

benefited from the related economic results, and the quota exchange has stimulated efficiency and added transparency. Iceland has played a key role in advancing *bilateral* and *multilateral regional fishery agreements* that will help ensure long-term sustainable yields from the fish stocks concerned.

However, the system could be further improved and extended. The small-scale fishing fleet should be fully incorporated into the ITQ system. Catch rules could be extended to include *additional commercial stocks*. With respect to *environmental objectives*, better knowledge and management of the marine ecosystem (e.g. species interdependency, sea bed protection), is needed, as is control of the fishing fleet's air emissions (e.g. CO<sub>2</sub>) and of fish processing effluents. It is important to increase transparency and consultation on the *allocative and distributional issues* involved in the fishery management system to broaden its acceptance and strengthen its benefits to Icelandic society. More research is needed on the long-term economic consequences of the system. The strategy for sustainable fishery management requires further development to assure coherence of environmental, social, territorial and economic objectives. In particular this relates to the regional distribution of landings and processing, which form the economic mainstay of many local communities. Overall, more *institutional integration* is needed to address the economic, environmental and social dimensions of the sustainable management of fisheries.

It is *recommended* to:

- continue the more stringent approach to TAC setting adopted with the introduction of the *cod catch rule* in 1995, as well as associated technical regulations (e.g. closure of fishing grounds, net size regulations);
- adopt and implement catch rules similar to the cod catch rule for *other species* as appropriate, taking into account their biology and their value for the future of Icelandic fisheries;
- undertake further analysis of the economic, social and environmental implications of the *ITQ system* in the light of the latest evidence and experience;
- fully incorporate *small vessels* into the ITQ system;
- integrate *environmental concerns* in fishery policies and practices, including improved management of marine ecosystems, control of CO<sub>2</sub> emissions from the fishing fleet and reduction of effluents from fish processing;
- further develop and implement the *strategy for sustainable fishery management*, ensuring the coherence of environmental, social and economic objectives.

### 3. International Co-operation

#### *Achievements*

Iceland is closely associated with European countries as a member of the Nordic Council and the EEA, and it has close ties with North American trading partners. Its economy is highly dependent on exports of fish and development of tourism, two sectors that require a high-quality environment and a positive, “green” image. Iceland developed its environmental policy at a fairly late stage but made significant progress in the 1990s, in particular by *transposing many EU directives* into its legal system and giving legal status to its international commitments. It has ratified and implemented many international agreements, and it hosts the secretariats of two working groups under the Arctic Environment Protection Strategy.

Iceland has consistently acted to ensure greater *protection of the seas*. In particular, it has promoted the adoption of a regional convention on *persistent organic pollutants* and is seeking the adoption of a worldwide convention on the topic. Its main aim is to ensure that consumers continue to see fish products as healthy and attractive and that the sustainability of the oceans, in particular the coastal zone, remains intact. At national level, Iceland has undertaken a wide-ranging study of invertebrates in its exclusive economic zone and measured the (very low) level of pollution of its waters. It has strengthened its response capability in case of an *oil spill* and has become a party to international agreements on oil spill prevention and preparedness.

Iceland is a party to only a few international agreements on *transboundary air pollution* but, as a member of the Nordic Council, has agreed to reduce its emissions of volatile organic compounds. Good progress has been achieved in this area.

The country’s unique *natural parks and protected areas* are great tourist attractions. Iceland has stepped up protection of wetlands under the Ramsar Convention and announced its intention to protect a larger part of its territory. Its carbon sequestration programme through revegetalisation has made considerable progress, and significant reduction in industrial greenhouse gas (GHG) emissions has been achieved.

#### *Areas for progress*

While Iceland’s international obligations and responsibilities are considerable, its population is small. In addition, public environmental awareness is fairly recent. Thus there are *significant gaps* in its international co-operation programme caused by insufficient staffing and financial means. Its commendable transposition of EU directives needs to be followed up by greater effort at local level to *implement the resulting legislation* and carry out related data collection. The significant steps taken to inform the Icelandic public need to be supplemented by similar efforts geared towards the



international community in order to publicise Iceland's achievements in fulfilment of environmental policies, its goals and objectives for future action, the state of its environment and the measures taken to implement new policies.

As Iceland seeks international support for its creative policies aimed at *sustainable use of its own natural resources*, it will need to give wider publicity to its efforts to protect its natural environment and to its special contribution to climate change policies, in particular through carbon sequestration. So far, Iceland has not taken extensive or far-reaching measures to reduce *GHG emissions from transport or the fishing industry*. Excluding new and expanded energy-intensive industry (using renewable forms of energy), it may be assumed that net CO<sub>2</sub> emissions will have been stabilised in 2000 at the 1990 level, in line with the national commitment. So far, Iceland has not agreed to become a party to the Kyoto Protocol. Its gross *GHG emissions in 2010 are likely to be well above the 1990 level*. Measures taken so far to reduce CO<sub>2</sub> emissions from transport and fisheries have been rather limited and could be strengthened, especially if Iceland wants to carry out a climate change policy with ambitious goals. Participation of all societal members and stakeholders in implementing such a climate change policy would be needed.

Iceland's per capita NO<sub>x</sub> emissions are considerably higher than the OECD average, the main reason being the large fishing fleet. They were supposed to be stabilised at the 1990 level, but are at present higher. On the other hand, they have been slowly decreasing in recent years, mainly because of the use of catalytic converters, despite the car fleet growth.

Although Iceland is well aware of the global dimension of environmental problems and of the need to help developing nations play a part in their solution, its contribution to *development aid* is, in relative terms, *among the lowest* for all industrialised countries and about four times below the level that the Icelandic Government said in 1993 was to be reached by 2000. Thus Iceland's bilateral aid is quite limited. Concerning multilateral aid, Iceland is not contributing to the Global Environment Facility, though it supports environmental projects in line with its foreign policy.

It is *recommended* to:

- develop and implement a meaningful programme of measures, in consultation with all stakeholders, to *reduce GHG emissions from transport and fisheries*, while seeking international support for the greater use of industrial processes based on clean and renewable energy sources;
- develop knowledge and promote understanding for a policy of *sustainable utilisation of all marine resources* without compromising the future of any marine species;
- implement the newly transposed EU directives and *collect necessary environmental data* to meet international commitments;
- develop policy to protect *Ramsar sites* and natural parks of outstanding interest, with a view to maintaining the integrity of the Icelandic wilderness;
- *combat* soil erosion and land degradation and *create carbon sinks* through revegetalisation;
- increase *official development assistance*, to reach the OECD-DAC average;
- complete the *national report on biodiversity*.

Part I

**ENVIRONMENTAL MANAGEMENT**

# 1

## IMPLEMENTING ENVIRONMENTAL POLICIES\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- pursue efforts towards revising and *implementing environmental legislation*, taking account of Iceland's EEA membership;
- strengthen *environmental licensing and enforcement*, e.g. by strengthening government inspection and environmental management by companies, and by ensuring that inspection fees cover inspection costs;
- define quantified *environmental policy objectives*;
- increase the use of *economic instruments* in pollution prevention and control and in nature conservation;
- stimulate environmental management initiatives by *industry*;
- assure timely implementation of the *physical planning* functions of municipalities.

### 1. Evaluation of Performance

#### *1.1 Institutional and legal framework*

Since its establishment in 1990, the Ministry for the Environment has been responsible for nature conservation and pollution control. In the 1990s, its scope of

---

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993.

responsibility was extended to physical planning and construction (1991), public health and foodstuffs (1995), and fire prevention and avalanche protection (1998). The Ministry for the Environment has set a range of qualitative environmental policy objectives, but only a few quantified targets (Chapter 1, Section 2.1). Its *staff has increased*: it has 23 employees working for the ministry only, and over 200 at the ministry and subsidiary agencies (Chapter 1, Section 2.2). In 2000, an Office of Sustainable Development and International Affairs was added to the Offices of Nature Conservation and Environmental Quality and the General Office (dealing with financial and administrative affairs). Legal affairs have been placed under the direct supervision of the Secretary-General. Environmental monitoring (Environment and Food Agency), nature conservation (Nature Conservation Agency) and soil conservation (Soil Conservation Service of the Ministry of Agriculture) are central government tasks.

Iceland has a two-tier government system. Since 1990, the number of municipalities has decreased from 220 to 124 (66 of which have fewer than 300 inhabitants) and this trend is expected to continue. *Local governments have been given increased responsibilities* in the fields of public health, pollution control and physical planning. They are gradually becoming more involved in nature conservation as well, with local nature research centres.

*Environmental legislation was almost completely revised* in the 1990s to take account of domestic objectives and international commitments, particularly reflecting the fact that Iceland is a signatory of the 1992 Porto Agreement creating the European Economic Area (EEA). Under the agreement, Iceland has to adopt most EU environmental directives (e.g. relating to air, water, waste, chemicals, foodstuffs and environmental impact assessment [EIA]), though not those in the field of nature conservation. Recent legislation includes the 1993 Public Access to Environmental Information Act, the 1993 Environmental Impact Assessment Act, the 1994 Protection and Hunting of Wild Species Act, the 1996 Genetically Modified Organisms Act, the 1996 Act on a Special Fee on Hazardous Waste, the 1997 Planning and Building Act, the 1997 Geodetic Surveys and Mapping Act, the 1998 Public Health and Pollution Control Act and the 1999 Nature Conservation Act. A new EIA Act was approved by the Althing (Parliament) in 2000.

## 1.2 Regulatory instruments

Environmental legislation gives a major role to regulation, which is based on operating permits. *Integrated pollution control licensing has been used* throughout the 1990s, requiring integrated permits covering air, water and waste management. The EU Directive on Integrated Pollution Prevention and Control was adopted in

Icelandic legislation in 1998, introducing stricter demands on the 20 firms covered by the directive. For example, permits are now granted for eight to ten years (rather than, as previously, an indefinite period). The Environment and Food Agency (EFA) supervises and monitors large firms, while inspection of smaller firms is the responsibility of local governments' public health inspectorates (which have a total of 50 inspectors, of whom 15 are in greater Reykjavik).

*Enforcement of environmental legislation is patchy.* Many small and medium-sized firms do not have operating permits. Authorities sometimes decide not to prosecute cases of off-road driving (restricted in 1998, banned since 1999), illegal dumping at sea, etc. The level of penalties is too low to act as a disincentive; cancellation of permits is sometimes used instead (for example, a fish meal plant was closed for odour problems). In 1998, a committee was set up under the auspices of the Ministry for the Environment to handle complaints; only a few complaints from individuals have been received. EFA staff attention has been diverted somewhat from implementation of pollution control tasks, as Iceland had to translate and adopt a large amount of EU legislation in a relatively short period.

The *challenge of implementing increasingly complex environmental legislation* should be easier to deal with once Iceland finishes transposing the package of EU regulations, and the national administration has become better acquainted with new legislation. In 1998, local inspectorates were grouped into ten regional ones. The number of public or accredited private inspectors should be increased at both national and regional levels; a rise in the annual flat-rate inspection fees recently took place, but is not enough to recover inspection costs. Indeed, revenue from laboratory analyses and inspection fees accounts for only 15% of EFA income, the rest coming from the national budget. Co-operation between the EFA and the regional inspectorates on licensing and enforcement should be fostered, e.g. through training and capacity building.

### 1.3 Economic instruments

Iceland's 1993 National Environmental Strategy, "Towards Sustainable Development", highlights the value of economic instruments in giving incentive to consumers and producers to adjust their consumption and production, stimulating innovation and encouraging individuals to find cost-effective ways to attain environmental objectives. There have been several examples of effective use of economic instruments (e.g. transferable fishing quotas, hazardous waste charges, deposit-refund programme for beverage containers), but overall, economic instruments have not been applied as widely in Iceland as in other Nordic countries for environmental

management (Chapter 1, Section 2.3). In particular, there is *scope to expand the use of charges for municipal waste and water services* (Chapter 2).

A *charge on hazardous waste*, introduced in 1996, applies to goods imported or produced in Iceland that result in hazardous waste (e.g. various oils and chemicals, paint, batteries). The revenue (ISK 163 million in 1999) is used to finance waste collection and safe disposal, following the *producer responsibility principle*. The unit charge has been progressively increased to fully recover the disposal costs by 2000. A special committee, with representatives from government and industry, oversees the system. Plans call for extending this system to other waste streams.

The *deposit-refund programme for beverage containers*, introduced in 1989, has been very successful in encouraging recycling (Chapter 2). The annual cost of collection and recycling is around ISK 180 million, of which ISK 60 million is covered by selling the recycled waste abroad. Businesses charge ISK 10 per *single-use plastic bag*; most of the proceeds go to a fund that finances environmental projects.

*Water charges* relating to public water supply and sewerage services are based on property characteristics. A fund of ISK 655 million was set up in 1995 from the central government budget to finance 20% of waste water infrastructure over 1995-2002 (Chapter 2). Waste water charges should be set according to the polluter pays principle, especially in view of increasing operating costs.

A *hunting licence fee* of ISK 1 600 per licence was introduced in 1994; associated revenue totalling ISK 17 million a year finances wildlife management and related research. The National Tourist Board allocates ISK 35 million a year to promote nature conservation in frequently visited areas; per-vehicle entrance fees should be collected from visitors to the main protected areas (Chapter 3).

In the *fisheries sector*, charges and tradable permits are used (Chapter 6).

#### 1.4 Other instruments

##### *Environmental impact assessment*

*Implementation of EIAs started* in 1994, with the Planning Agency as the review body. As a result, the environmental design of projects and consultation with stakeholders have improved. Of the 105 EIAs carried out since 1994 (mostly for road rebuilding), nearly half went to appeal. Under the EIA law, anyone can appeal the Planning Agency decision to the Ministry for the Environment. The appellant does not need to be involved in the project or live in the project area. A second-stage assessment has been required for nine projects (e.g. a road, an aluminium smelter, a

power plant and a water reservoir). No project has been rejected so far as a result of its EIA.

The *quality of EIAs has varied greatly*. Projects' nature conservation criteria have often been missing; cumulative effects were not covered; public participation has been limited. Assessments have rarely included cost-benefit analyses and social impacts. The 1993 EIA Act had only general requirements for the contents of EIAs and the Planning Agency could deal with omissions and faults in the assessment only at the final stage of the process. The new EIA Act of 2000 provides for early submission of a scoping document on proposed projects, for review and approval by the Planning Agency. Research bodies (e.g. universities, the Natural History Institute) should be more involved in the preparation of EIAs. The new EIA Act meets requirements of the 1997 EU directive. Further planned legislation in a few years would extend EIA to plans and programmes.

### *Physical planning*

The *1997 Planning and Building Act* states that all Iceland, not just inhabited areas, is subject to physical planning. The *1998 Municipalities Act* subdivided the whole country into municipalities, thereby extending a subdivision previously focused mainly on coastal areas. Planning is carried out at three levels by the municipalities: local, municipal and regional. Local plans and municipal plans are mandatory. Each municipality has until 2007 to draw up a land use plan for its area. Regional plans can be initiated by two or more municipalities or by the Planning Agency. Municipal and regional plans have to be approved by the Ministry for the Environment. Building in the highlands is subject to planning and licence. Between 1993 and 2000, EIAs were required for the construction of all tourist facilities outside inhabited areas. From 2000, it is up to the Planning Agency to decide whether an EIA is needed for each project. In 1999, a Regional Plan for the Central Highlands was approved, running to 2015 (Chapter 3).

Land ownership and user rights in the highlands have been unclear and subject to much debate and legal dispute. According to the *1998 Public Lands Act*, all lands for which private ownership cannot be proven will become state owned and placed under the supervision of the prime minister by 2007. The designation of land as public land, however, will not cancel traditional user rights, and all decisions on land use will have to be subject to consultations with appropriate parties, a process overseen by a special committee.

According to the *1998 Act on Research and Use of Underground Resources*, abstraction of groundwater, minerals, gravel and geothermal heat requires a licence by the Ministry of Industry and Commerce. Landowners are compensated through



individual agreements or property size assessments. The Act does not cover the use of hydropower or geothermal steam for electricity production. The Ministry of Industry and Commerce is developing a master plan, in co-operation with the Ministry for the Environment, on the use of hydro and geothermal energy sources (Chapter 3).

### *Role of industry*

*Industry has taken limited voluntary action* in pollution abatement and control. Two companies are certified ISO 14001 (four more are on their way), none by EMAS. Two companies (a soap and detergent manufacturer and a printer) have had a product or production process registered with the Nordic White Swan eco-label; a few others are working on registration. However, there is growing interest in environmental management: around 50 firms have systematic work progressing on environmental management and cleaner production. The main obstacles to certification and environmental management are lack of market demand and limited environmental awareness and education among industrial staff.

*Eco-industries and eco-services are not yet developed.* A few companies have used eco-design in product development. There are specialists in engineering services (fewer than 50 in environmental management and EIA, 50 in waste water treatment facilities), in research institutes (fewer than 50) and in the recycling industry. According to the Technological Institute, companies spend around ISK 15 million annually on environmental research and development.

## **2. Focus on Selected Topics**

### **2.1 Environmental policy objectives**

A number of environmental policy objectives are spelled out in *various documents*: laws and regulations (Table 1.1), international agreements to which Iceland is party, strategic and planning documents (“Towards Sustainable Development” published in 1993 and “Sustainable Development in Icelandic Society: An Action Plan” published in 1997). A 1999 policy statement by the governing coalition includes key environmental goals. The Ministry for the Environment has also released an action programme (1995-2000).

With regard to environmental management, *waste going to disposal* was intended to be reduced by 50% by 2000 compared to 1990. A special project will be set up to increase the reuse and recycling of waste. The main initiatives in the area of *water management* relate to fulfilling the requirements of the 1991 EU urban waste water directive. The establishment of *new protected areas* in the central highlands is

to be considered on the basis of the Regional Plan for the Central Highlands. A policy is to be developed to protect untouched wilderness areas. Nature conservation should take account of other types of land use, such as tourism, outdoor recreation and natural resource use. The Ministry for the Environment and the Ministry of Agriculture are to draw up a plan for the *reclamation of wetlands*, in close consultation with land-owners. As a general objective, the Ministry for the Environment, in co-operation with the Ministry of Finance, will examine ways to further use *economic instruments* to meet environmental goals.

More specific objectives seek to integrate economic development and environmental protection. Regarding *marine resources*, the government aims to amend the 1990 Fishery Management Act to get the widest possible consensus on the fishery

---

Table 1.1 **Environmental legislation, 1990-2000**

---

1990	Regulation establishing the Ministry for the Environment
1990	Fishery Management Act
1992	Icelandic Institute of Natural History Act
1992	Act on Restriction of Fires in Open Landscape
1993	Public Access to Environmental Information Act
1993	Environmental Impact Assessment Act
1994	Protection and Hunting of Wild Species Act
1994	Tourism Administration Act
1994	Organic Farming Act
1995	Act on Financial Support to Municipalities for Sewage Control
1995	Act on the Protection of Breiðafjörður
1995	Foodstuffs Act
1995	Farm Afforestation Act
1996	Genetically Modified Organisms Act
1996	Act on a Special Fee on Hazardous Waste
1996	Nature Conservation Agency Act
1996	Act on Fisheries outside Icelandic Waters
1996	Act on Responsible Utilisation of Fish Stocks
1997	Planning and Building Act
1997	Geodetic Surveys and Mapping Act
1997	Southland Afforestation Act
1998	Public Health and Pollution Control Act
1998	Municipalities Act
1998	Public Lands Act
1998	Act on Research and Use of Underground Resources
1999	Nature Conservation Act
1999	Act on Regional Afforestation Programmes
2000	Environmental Impact Assessment Act

---

Source: OECD.

---

management system, which is characterised by individual transferable quotas; the intent, however, is that this shall not be achieved at the expense of sustainable harvesting of marine resources. Regarding *energy resources*, it has been the aim of successive governments to further exploit Iceland's hydropower and geothermal energy resources to stimulate economic growth; the current administration aims at a consensus to meet both energy development and nature conservation objectives. The development and use of cleaner fuels, such as hydrogen and methanol, will be encouraged through special projects. Regarding *tourism*, increased marketing efforts will encourage its development. More funds will be made available to develop facilities at protected areas and frequently visited tourist sites. Regarding soil resources, to enhance soil conservation, farmers should increasingly be involved in land reclamation and reforestation programmes.

In the field of *international co-operation*, Iceland attaches high importance to the quality of marine waters around the island, in light of the importance of fishing for the Icelandic economy. Iceland actively takes part in negotiations, under the auspices of the UN Environment Programme, on limiting persistent organic pollutants. Overall, the "*clean image*" of the country and of Icelandic products is seen as an asset for export and the tourism industry. It is an explicit aim of the government to sign and ratify the Kyoto Protocol, once Iceland's special circumstances and concerns (e.g. small size of the economy, high rate of use of non-polluting energy sources) are recognised in the Kyoto follow-up negotiations.

## 2.2 Environmental agencies

A range of agencies operates under the auspices of the Ministry for the Environment. The EFA implements legislation related to environmental quality, food safety, chemicals and toxic substances; supervises and co-ordinates the work of local public health inspectorates; provides professional advice and drafts law proposals for ministries; and works to educate the public about environmental matters. The EFA, founded in 1982, is structured into three offices (Pollution Control, Food, Chemicals) and one laboratory. In 1995, its staff was increased to 50, to cover new responsibilities on greenhouse gas inventories. Fourteen staff members belong to the Pollution Control Office. Transfers to the EFA from the national budget amounted to ISK 181 million in 2000 (a 50% increase since 1996).

The *Planning Agency* implements planning and construction laws and regulations and oversees EIAs. It makes suggestions to the Ministry for the Environment on whether municipal and regional plans should be approved. It also helps municipalities draw up land use plans. Disputes are ruled on by a Planning and Building Tribunal whose members are appointed by the Ministry for the Environment for four year

terms. Planning in the central highlands is the responsibility of an appointed committee, also on four year terms. The Planning Agency has a staff of 19, four of whom deal with EIAs. Transfers to the agency from the national budget totalled ISK 214 million in 2000, a twofold increase since 1996.

In 1997, the Nature Conservation Council, an advisory body to the Ministry for the Environment, was replaced by the *Nature Conservation Agency* (NCA), which has a more active role. It supervises management of protected areas and is responsible for general nature protection, including monitoring the effects of human activities on the environment. Landscape and cultural landscape protection are also among NCA tasks. The full time staff numbers 16 (plus 35 in summer). Government transfers to the NCA came to ISK 92 million in 2000, a 35% increase since 1997. The Icelandic *Natural History Institute* conducts basic and applied research in botany, geology and zoology, advises on the sustainable use of natural resources and land use, and assesses the conservation value of species, habitats and ecosystems. Its budget was ISK 240 million in 2000, of which ISK 133 million was from government transfers and ISK 107 million from private sources. Government transfers to the institute have increased by 70% since 1996. The *Wildlife Management Institute*, based in Akureyri, oversees the hunting and management of wild birds and land mammals, with a budget of ISK 56 million in 2000. The *Lake Myvatn Research Station* in northern Iceland is a small, specialised agency conducting research on an extremely productive ecosystem rich in bird life.

The *National Land Survey* (recently moved from Reykjavik to Akranes) implements the 1997 Geodetic Surveys and Mapping Act, with a budget of ISK 169 million in 2000. The *Meteorological Office* (budget of ISK 356 million in 2000) is in charge of meteorological observation and research, as well as earthquake and geophysical monitoring, and avalanche prediction and monitoring. The *Fire Authority* (budget of ISK 87 million in 2000) supervises first aid and clean-up after pollution accidents, working through municipal fire departments. The *Stefansson Arctic Institute*, established in Akureyri in 1998, undertakes research on polar matters.

### 2.3 Use of economic instruments

Iceland uses a number of economic instruments (Table 1.2). For instance, it has accumulated considerable experience with individual *transferable fishing quotas* (Chapter 6). Other environmentally related *taxes and subsidies* apply: e.g. in the areas of transport and soil conservation (Table 4.2). The experience is less extensive for the use of *economic instruments for environmental management* per se. The Ministry for the Environment and the Ministry of Finance are reviewing the feasibility of introducing further economic instruments in environmental management.

Table 1.2 Economic instruments,<sup>a</sup> 1999

Instrument	Rate	Comments
<b>A. Charges</b>		
<b>Public water supply</b>		
Households	ISK 76 per m <sup>2</sup> of property	
Industry	ISK 14.34/m <sup>2</sup> fixed charge plus volume-based charge	
<b>Waste water services</b>	Payments for use of sewerage are 0.13-0.16% of the value of the property connected	
<b>Waste</b>		
Charge on goods that result in hazardous waste	Rate differentiated according to 11 product categories (e.g. mercury, batteries, paint, waste oil); from ISK 0.1/kg (waste oil) to ISK 900/kg (mercury)	Revenue: ISK 163 million. Finances collection, treatment, recycling and destruction of hazardous waste. Fully operational in 2000.
Deposit-refund for bottles, aluminium cans, plastic containers	Deposit: ISK 7.35/container Refund: ISK 7.00/container	Revenue: ISK 500 million; collection and recycling costs: ISK 180 million. Proceeds to fund environmental projects. Measure is to address high consumption of packaged beverages (13 kg/capita/year).
Charges on plastic bags	ISK 10 levied by businesses on single-use plastic bags	
<b>Other charges</b>		
Fee to regulate hunting and wildlife management	ISK 1 600/year for hunting permit	Revenue: ISK 17 million. Used for wildlife management. Fee is effective for regulating hunting.
Fee to fund rationalisation of fishing sector, regulate fishing, reduce cost, maximise sustainable yield	ISK 1 200/tonne of cod or cod-equivalent	Revenue: ISK 600 million. No real effect on fish management as such (regulated through quota system).
<b>B. Tradable permits</b>		
Individual transferable fishing quotas	Allocation of quotas based on historical catch	Quotas to regulate fishing, reduce cost, maximise sustainable yield.

a) See Table 4.3 for environment-related taxes and subsidies.  
Source: OECD.

# 2

## WATER AND WASTE MANAGEMENT\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- continue investing in *waste water infrastructure*;
- apply the user pays principle in *pricing for waste water services* to households and industry, e.g. through volumetric pricing;
- introduce nutrient management plans at farm level for *intensive pig and poultry production*;
- adopt, as soon as possible, comprehensive *waste management legislation*;
- extend *producer responsibility* to packaging waste, end-of-life vehicles and old tyres;
- complete licensing of all landfills and incinerators as soon as possible, charge for *landfill waste disposal* and continue to develop modern municipal waste treatment.

### 1. Evaluation of Performance

#### 1.1 Water quality

##### *Trends in water quality*

In the 1990s, *inland freshwater resources* remained abundant and of high quality. The chemical quality of rivers is generally comparable to that of pollution-free rivers

---

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993.

in Europe and North America. Concentrations of heavy metals in rivers are well below the levels specified in EU standards for drinking water. Icelandic lakes, which are all in sparsely populated areas, have very low levels of heavy metals and toxic contaminants. Nutrient concentrations in inland waters were reviewed in 1999, in the context of Iceland's implementation of the EU's 1991 nitrate directive; low concentrations were found in lakes and rivers and no significant effects from diffuse discharges from agriculture were noticed. Nitrate concentrations in springs and drinking water show insignificant effects from human activities.

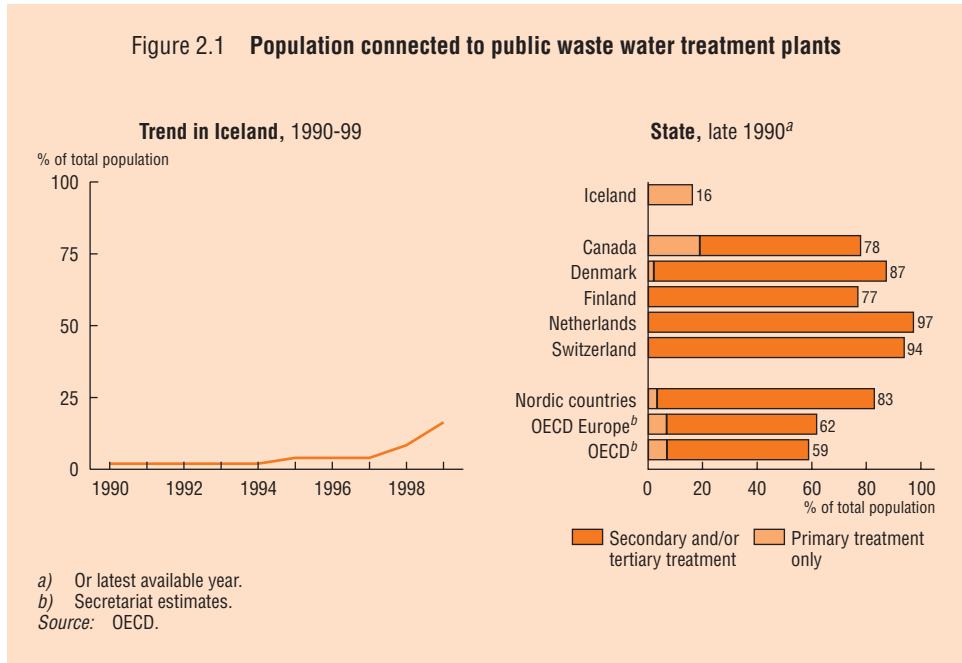
Overall, the quality of *coastal waters* has also remained close to natural conditions. In the Faxaflói Bay area, where more than half of Iceland's people live, research showed negligible or no increases in nutrient concentrations in the 1990s. Occurrence of *heavy metals in sediments* is linked to volcanism, although greater concentration in the Reykjavik vicinity can be attributed to pollution from waste water. Marine fauna has been monitored for *heavy metals* since 1989, with sampling of species representative of different habitats (cod, dab and mussels): concentrations of heavy metals except cadmium are low compared with seafood from other Nordic coastal waters; concentrations of cadmium are below the the World Health Organization's Tolerable Weekly Intake standard. The relatively high *cadmium* levels in the Icelandic marine environment are thought to be of volcanic origin.

### *Industrial and urban waste water*

Most *urban and industrial waste water* is discharged untreated into the ocean. Some 90% of the population is connected to public sewerage and 6% to private or independent sewerage. Industrial discharge of heavy metals and toxic contaminants into water is not a concern in Iceland. It is estimated that organic effluents from fish and shrimp processing factories account for 20 000-30 000 population equivalent (p.e.). Farms and small rural communities are equipped with septic tanks, accounting for around 10% of total waste water in Iceland.

Only 16% of households are connected to public waste water treatment plants. This remains the lowest percentage of any OECD country (Figure 2.1). However, the *share of population connected has been rising in recent years* (it was just 2% in 1990), and is expected to rise further in the near future, reflecting the commissioning of new treatment facilities to comply with the 1991 EU urban waste water treatment directive. A first waste water treatment plant started to operate in Reykjavik in 1998, combined with a sewage outlet pipe discharging at sea four kilometres from land. Many others are under construction or planned, all providing primary treatment only. A second treatment plant will serve Reykjavik (110 000 inhabitants) and nearby

Figure 2.1 Population connected to public waste water treatment plants



Kopavogur (20 000 inhabitants) by 2002, with total capacity of 300 000 p.e. A facility at Hafnarfjörur (18 000 inhabitants, in the Reykjavik area) will be operational by the end of 2000. Akureyri (15 000 inhabitants) and the Keflavik area (10 000 inhabitants) should also have a waste water treatment plant in the next few years. The share of Icelandic households connected to public waste water treatment should be close to 60% by 2002. A 1999 survey of the dilution capacity of Faxaflói Bay suggests that its recipient water might be defined as a lower sensitivity area, and that treatment could therefore be primary.

*Expenditure on sewerage and waste water treatment* increased in the late 1990s and is expected to continue to do so. An improvement fund was established to cover 20% of municipalities’ investment expenditure from 1995 to 2005. Half of the fund is currently used for the Reykjavik area and the other half to build combined sewers and outfalls in the rest of the country.

*Waste water charges*

Efforts should be made to achieve a high degree of cost recovery on *waste water services to households* (Chapter 2, Section 2.1). Households currently pay for waste water services based on the property tax. In a context of rising expenditure, and in



line with the *polluter pays principle*, a volumetric rate should be introduced based on the volume of hot water consumed, which corresponds to most of the waste water discharged and is already metered (Chapter 2, Section 2.2).

Concerning *waste water from industry* (for which both hot and cold water are metered), charges should also be introduced, with different rates per unit of toxicity. In 1999, integrated pollution control (IPC) licences were made compulsory for polluting industries and quality standards were established for effluents and recipient waters. In a first step, the waste water charge for industry could be based on the quantity of discharge for which a permit has been given; in a second step, the base of calculation should be the measurement of actual discharges.

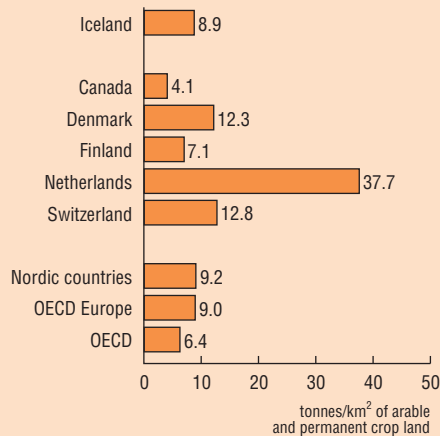
### *Agricultural pollution*

About half of nitrogen releases from agriculture come from mineral fertilisers and the rest from livestock manure (mostly from cattle, sheep and horses and, more recently, intensive pig and poultry farming). Commercial fertilisers are used mainly on grasslands; the application rate of nitrogenous fertiliser remained virtually unchanged in the 1990s, after a 20% decrease in the 1980s: at 89 kg N per hectare of crop land, it is equivalent to the OECD Europe average (Figure 2.2). Releases from livestock manure are essentially unchanged, as a reduction in the size of sheep herds since 1990 has been accompanied by an increase in the number of horses. Overall, the *nitrogen surplus from agriculture*, as calculated by the national nitrogen balance, remained low in the 1990s, at around 7 kg per hectare of total agricultural land.

Nevertheless, there is a relatively high nitrogen load on the tiny coastal area of cultivated crop land, which covers 120 000 hectares or 1.2% of the total land area. Nitrogen concentrations are diluted in the main rivers, thanks to high flow rates, and groundwater used for human consumption is for the most part not abstracted downstream from fertilised cropland. However, excess nitrates may have important implications for aquatic life in small tributaries and in wetlands. This suggests the need to undertake closer monitoring of potential diffuse impacts of agriculture on water quality.

Although it does not account for a major share of the national nitrogen balance, pig production can be a local threat to water quality. Since disposal at sea was prohibited in 1999, the sole disposal method for *pig slurry* is land spreading, which may lead to nitrate and phosphorus contamination of surface and groundwater. Intensive pig farming has increased in recent years and Iceland now counts six large production units (of up to 20 000 pigs), four of which are in the vicinity of

Figure 2.2 Use of nitrogenous fertilisers, 1997



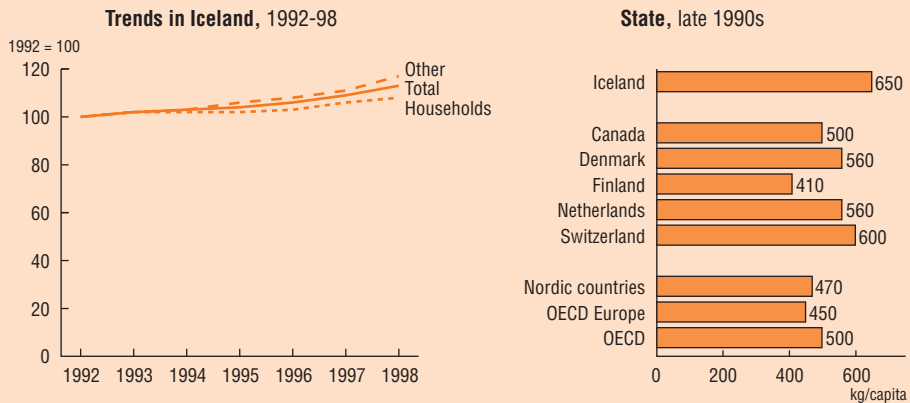
Source: FAO; OECD.

Reykjavik. Only two units are operating with licences. All these units should operate in conformity with the legislation on IPC licensing, which applies to animal farms. Other regulations were issued in 1999 to provide for the proper use or disposal of livestock manure, including land spreading. Nutrient management plans should be prepared at the farm level, under the supervision of the Ministry for the Environment and the Ministry of Agriculture, to comply with the EU nitrate directive.

## 1.2 Waste management

### *Trends in waste generation and disposal*

Nearly 240 000 tonnes of waste was generated in Iceland in 1998 (Table 2.1). *Municipal waste generation* increased by 10% between 1992 and 1998 in Iceland as a whole (and much more than that in Reykjavik), to some 650 kg per capita per year (Figure 2.3). Over the same period, generation of scrap metal increased by more than 80% and of hazardous waste by 30%. *Hazardous waste* mainly consists of oil

Figure 2.3 Municipal waste generation<sup>a</sup>

a) In interpreting national figures, it should be borne in mind that survey methods and definitions of municipal waste may vary from one country to another. According to the definition used by the OECD, municipal waste is waste collected by or for municipalities and includes household, bulky and commercial waste and similar waste handled at the same facilities.

Source: OECD.

Table 2.1 Waste generation,<sup>a</sup> 1998

Waste	Generated ('000 tonnes)	Recovered (%)
Municipal	178.6	
Commercial	97.0	17.5
Household	68.0	2.9
Garden waste	10.0	25.0
Beverage containers	3.6	100.0
Scrap metal <sup>b</sup>	35.0	88.6
Slaughterhouse waste	10.0	7.0
Hazardous waste	7.5	74.7
Municipal sludge	5.0	–
Old tyres	2.5	–
Total	238.6	26.2

a) Excluding construction and demolition waste, agricultural waste other than slaughterhouse waste, and waste from aluminium smelters and cement factory.

b) From cars and assorted machinery.

Source: Ministry for the Environment.

(82%), car batteries (11%) and materials such as solvents and oil-based paints (7%). Medical waste, which is not reported, amounts to some 700 tonnes a year.

A key policy objective was put forward in 1993, stating that at the turn of the century 50% less waste should go to disposal. This *objective is unlikely to be achieved*, as overall waste generation has increased and waste disposal still accounted for 74% of waste generated in 1998 (Table 2.2). *Waste recovery* in 1998 accounted for about 26% of total waste generated, compared with 20% in 1992.

Waste for disposal goes to landfills (86%), incinerators (13%) or open pit burning (1%). Open pit burning in rural areas was reduced by 90% in 1992-98. Over the same period, waste disposal in *landfills* increased by 17% and the number of landfills rose from six to 29. The share of landfilling at sites with permits increased from 57% to 85% and should be close to 100% by the end of 2000. Three of the remaining six open pit burning sites will be closed in 2000. Three new municipal waste *incinerators* have been built since 1992, and two of Iceland's three old incinerators will be shut down by the end of 2000, as they do not fulfil emission requirements. As a result, total annual incineration capacity will be unchanged at about 15 000 tonnes, of which 25% involves energy recovery.

Table 2.2 **Waste recycling and disposal**

	(%)	
	1992	1998
<b>Amounts</b>		
Recovery and recycling	20	26
Disposal	80	74
Incineration	6	6
Landfill	66	67
Open-pit burning	8	1
Total	100	100
<b>Recycling rates<sup>a</sup></b>		
Paper	10	20
Plastic	0	5
Glass	50	60
Aluminium	70	90
Ferrous metals	70	90
Non-ferrous metals	70	90

a) Municipal waste only.

Source: EFA.

### *Policy measures*

Quantities of *scrap metal* exported for recycling have been steady for more than ten years. Waste from the *fish processing industry* is usually recovered to produce fish meal. The *deposit-refund programme for single-use beverage containers* introduced in 1989 has encouraged recycling to the extent that virtually all beverage containers are returned. In 1998, the number of containers used was 72 million (around 13 kg per capita) and the amount of fees collected was around ISK 500 million.

The collection and safe disposal of *hazardous waste* have been practised since the early 1990s: e.g. a modern reception centre was opened in Reykjavik in 1991, and systematic collection of PCBs and collection of batteries have occurred since 1989. A high recovery rate has long been achieved by using waste oil instead of coal at the cement factory. In 1996, legislation introduced *hazardous waste charges*: i.e. charges on the domestic production and import of materials that later led to hazardous waste. Corresponding revenue (5% from charges on domestic products and 95% from imported ones) is earmarked in a special fund and used to finance recovery and disposal of hazardous waste (Chapter 2, Section 2.3). Very good results have been obtained. Car batteries are exported to Sweden and the United Kingdom. Paint and solvents are recycled in Iceland or exported to Denmark. Tributyltin use in shipping was prohibited and its use on land ceased by 1994, as proposed in the Nordic Plan (Chapter 7).

Extending this type of *producer responsibility* to other important waste streams is being considered. This would apply in particular to packaging waste, end-of-life vehicles and old tyres. A committee has recently been created within the Ministry for the Environment to *prepare legislation on waste management*, and municipalities have started to work out regional waste management plans. Priority is given to *packaging waste* to fulfil requirements of the 1994 packaging waste directive, as a consequence of European Economic Area (EEA) membership. Recovery has increased for several waste streams (Table 2.2). Some household waste is delivered to recycling stations: e.g. cardboard, newspaper, milk cartons and other composite beverage containers, and garden waste. Among commercial waste components, wood has a high recycling rate, being used in the ferrosilicon plant, while cardboard and paper are increasingly exported for recycling, after a period during which collection stagnated. More efforts are needed on recycling plastic, and similar efforts should be made for farm plastics such as the bale wrap used to conserve fodder.

The 1999 landfill directive, which is being made obligatory for EEA countries, requires reduction in *biodegradable waste* consigned to landfill. This will eventually lead to recycling operations, the technical nature of which is not yet clear in Iceland: gas extraction and composting seem the most promising options. In recent years, drum

composting facilities have been installed, serving communities with populations of 120-400 people. Large-scale windrow composting is under way, partly financed by private companies to promote the greening of eroded soil.

Efforts have been made to close *unsatisfactory municipal landfills*. The municipalities of greater Reykjavik have established a modern intercommunal landfill, which accounts for nearly 80% of the national landfill capacity. Concerning incineration, all small municipal waste incinerators currently operating in Iceland would have to be closed if more stringent requirements for air pollutant emissions were to be introduced, as is envisaged at the EU level. Building larger, modern incinerators should be envisaged, provided investment and operating costs are recovered. This would make it easier to meet recovery targets and could also allow treatment of the increasing amount of sewage sludge, which is now landfilled.

Many households pay no or relatively low *waste charges* (based on property characteristics), and only a quarter of investment and operating expenditure on waste management is currently recovered. Weight-related charges should be introduced to the extent possible. Introducing a *landfill tax* (per tonne) payable by landfill operators would ensure that landfill waste disposal is properly priced, and would influence behaviour away from landfill towards reuse, recovery or recycling. There is considerable scope for *increased private sector participation and investment in waste management* on a commercial basis. Currently only waste collection is privately run.

## 2. Focus on Selected Topics

### 2.1 Cost recovery on sewerage and waste water treatment expenditure

*Investment expenditure* for the construction of municipal sewerage and waste water treatment plants is expected to reach ISK 7.7 billion for 1995-2005, an average of ISK 700 million per year. A 1995 law provides for central government support for up to 20% of investments by local authorities. In Reykjavik, cost recovery on investment is around 66% of expenditure (net of central government support), or only 50% if a 5% interest rate is applied on the contracted loans (Table 2.3).

*Operating expenditure* for Reykjavik sewerage totalled ISK 100-125 million per year over 1990-98. It increased to ISK 150-160 million with the entry into operation of the first waste water treatment plant and is expected to reach ISK 200 million when the second treatment plant starts operating. In Reykjavik, most operating expenditure is recovered. Data for other municipalities are not available.

Table 2.3 **Cost recovery from waste water charge in Reykjavik<sup>a</sup>**

(million ISK)

	1995	1996	1997	1998	1999 <sup>b</sup>	2000 <sup>c</sup>	2001 <sup>c</sup>	2002 <sup>c</sup>	Total 1995-2002
Total investment expenditure	2 676	387	763	551	331	709	1 500	800	7 717
Central government support		66	52	129	58	30	100	220	655
Net cost to other municipalities	331	23	96	0	5	0	0	0	456
Net cost to Reykjavik	2 344	298	614	422	268	679	1 400	580	6 606
Revenue from waste water charge in Reykjavik	653	614	605	616	645	760	760	760	5 413
Cost recovery on investment	653	526	518	466	500	600	600	600	4 464
Cost recovery on operation	0	88	87	150	145	160	160	160	949

a) Main sewerage and waste water treatment, excluding secondary pipes of houses and businesses connected to the main sewer.

b) Provisional.

c) Forecast.

Source: Ministry for the Environment.

## 2.2 Pricing geothermal water and cold water use

Almost the entire population of Reykjavik and five neighbouring communities (58% of the national population) uses *geothermal hot water* for district heating and as tap water. In Reykjavik, thermal water supply is metered and is supplied at low cost (USD 0.73/m<sup>3</sup>). Thermal water use has been decreasing and is now 1.2 cubic metre per cubic metre of space, due to better insulation in new buildings (Table 2.4). About 85% of the hot water from Reykjavik Energy (RE) is used for space heating and 15% for bathing and washing. RE uses either a single or a double distribution system. In the double system, the return flow from the consumer runs back to the pumping stations, where it is mixed with hotter thermal water and recirculated. In the single system the backflow goes directly into the sewers.

Households pay for *cold water supply* according to their local property tax; there is no cold water metering. Drinking water prices are low by international standards (Table 2.5). Water abstraction control is supervised by the Ministry of Industry and Commerce. Cold water abstraction by water-intensive industries is metered.

**Table 2.4 Hot water use in Reykjavik**  
(m<sup>3</sup> hot water/m<sup>3</sup> heating space)

	1980	1985	1990	1995	1998
Geothermal water production	1.9	1.8	1.7	1.5	1.3
Measured hot water consumption in houses	1.8	1.6	1.5	1.4	1.2

Source: RE.

**Table 2.5 Water prices,<sup>a</sup> 1996**  
(USD/m<sup>3</sup>)

		At current exchange rates	Corrected for PPP <sup>b</sup>
Iceland	Reykjavik	0.61	0.53
	Hafnarfjörður	0.51	0.44
Netherlands	Amsterdam	1.20	0.99
	The Hague	1.92	1.59
	Utrecht	0.94	0.78
Switzerland	Berne	1.22	0.74
	Geneva	2.25	1.35
	Zurich	2.26	1.36
Denmark	Copenhagen	1.34	0.93
	Aarhus	0.89	0.62
	Odense	0.98	0.68
Finland	Helsinki	0.85	0.66
	Tampere	0.90	0.70
	Vaasa	1.32	1.03
Canada	Ottawa	1.70	1.95
	Toronto	0.63	0.73
	Winnipeg	0.75	0.87

a) Prices calculated for water supply to a family of four (two adults and two children) living in a house with garden rather than an apartment. Price based on annual consumption of 200 m<sup>3</sup>. VAT not included.

b) Purchasing power parities.

Source: International Water Supply Association.



### 2.3 Producer responsibility: hazardous waste charge

The 1996 regulation on hazardous waste prescribes different *charge rates* for different types of hazardous waste: ISK 900/kg for halogenated chemicals and products containing mercury; ISK 200/kg for small batteries; ISK 60/kg for car batteries; ISK 20/kg for oil paints; ISK 16/kg for pesticides; ISK 10/kg for isocyanates; ISK 5/kg for chemicals for photography and related uses; ISK 3/kg for volatile compounds; and ISK 0.1/kg for waste oil.

The revenue, totalling around ISK 132 million a year, goes to a *hazardous waste fund*, which covers expenditure to collect, store, transport and handle hazardous waste before its export (Table 2.6).

Table 2.6 **Hazardous waste fund, 1999**  
(million ISK)

	Waste oil	Oil-base paint	Car batteries	Chemicals (photography)	Chemicals (halogenate)	Other <sup>a</sup>	Total 1999	Total 1998	Total 1997
Revenue	58	17	31	16	2	8	132	77	41
Import	58	10	31	16	2	8	126	70	39
Domestic production	0	7	0	0	0	0	6	7	2
Expenditure	44	25	22	13	5	10	118	68	33
Collection	38	21	11	10	5	6	91	43	17
Storage	1	2	3	1	0	1	7	5	2
Transport	0	1	5	1	0	1	7	5	3
Handling	4	1	2	1	0	0	10	9	5
Other	1	0	1	0	0	2	3	6	6
Balance	14	-8	9	3	-3	-2	14	9	8

a) Volatile compounds, small batteries, cooling fluids, pesticides, isocyanates, products with mercury content.

Source: Ministry for the Environment.

# 3

## LAND MANAGEMENT AND THE CENTRAL HIGHLANDS\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- streamline soil conservation policy objectives by defining *quantitative targets for sustainable land use, soil reclamation and vegetation cover*;
- regulate *livestock density* based on the carrying capacity of soils, as defined by the Soil Conservation Service, for both sheep and horses;
- follow up on the 1997 survey of *soil erosion* by identifying the various pressures and potential policy responses;
- continue to implement the new legal framework and regional plan for the *central highlands* and increase the responsibility of local stakeholders in land reclamation by clarifying communal and individual *land ownership and user rights* in the highlands;
- extend *protected areas* significantly as regards wilderness and landscape protection (e.g. in the central highlands and coastal areas); prepare and implement *management plans* in all national parks, and extend red lists to cover all relevant species in Iceland;
- increase ranger staff and funding for *nature conservation*, e.g. by applying the user pays principle to the tourism sector, inter alia, through fees and levies on visitors to protected areas;
- diversify farm income by promoting *agro-tourism* and farm forestry.

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993.

## 1. Evaluation of Performance

### 1.1 Curbing soil erosion

Soil erosion has resulted from the clearing of woodlands (which cover 1% of the total land area now, compared with 24% at settlement some 1 100 years ago) and centuries of sheep grazing. Nearly 60% of the total land area is barren, compared with about 20% at settlement. The Agricultural Research Institute and the Soil Conservation Service (SCS) conducted the first comprehensive survey of soil erosion in Iceland between 1990 and 1996 and found acute *erosion problems* in about half of the country, excluding mountains, glaciers and waters (Table 3.1). Concerning agricultural soils, 5% of permanent grassland is affected by moderate water erosion and 50% by wind erosion; around 230 hectares of soil are lost each year from Iceland's 2 million hectares of thick, fertile volcanic soil, which is covered with rich vegetation but lacks cohesiveness.

*Pressure from grazing remains a concern.* Pressure from sheep grazing has declined, but that from horse grazing has increased (Table 3.2). The net effect on the vegetative cover is difficult to assess. The number of sheep has decreased continuously since the late 1970s, when conditions for export worsened as a result of reduced export subsidies and increased supply on the world market. Summer grazing in the highlands has become marginal, accounting for about 10% of the sheep

Table 3.1 **Soil erosion, 1996**

Erosion category	Area (million hectares)	Area (% of total)	Area <sup>a</sup> (%)
0. None	0.4	4	5
1. Slight	0.8	7	10
2. Moderate	2.7	26	34
3. Considerable	2.3	23	29
4. Severe	1.1	11	14
5. Very severe	0.6	6	8
<i>Mountains, glaciers, waters, other</i>	2.4	23	
Total	10.3	100	100

a) Excluding mountains, glaciers and waters.

Source: SCS.

flock, as it is increasingly difficult to find good grassland and the costs of herding continue to rise (it can take 15 people five days to round up 200 adult sheep). Other areas, however, are still subject to high pressure from sheep grazing. The number of horses has increased to meet rising domestic demand for riding, as well as demand for exports (chiefly to Germany and Japan). The grazing period for horses is much longer than for sheep: it is estimated that one horse grazes as much as seven sheep. Horses are mostly raised on coastal plains where the vegetation is not as fragile as in the highlands.

*Incentives have been provided to farmers, mainly sheep farmers, to undertake land reclamation (Chapter 3, Section 2.1). Border protection for imported meat products is still high, however; although the weight of market price support in the total producer support estimate (PSE) has fallen, it still accounts for 55% (down from 88% in 1990). Moreover, the level of agricultural support in Iceland remains one of the highest among OECD countries, with a PSE of 68% compared with the OECD average of 40% in 1999. High levels of production-related farm support contribute to environmental damage caused by inappropriate grazing practices. A further reduction in farm support, combined with making support conditional on compliance with sustainable grazing management and good environmental practices, would help improve economic efficiency while contributing to more efficient allocation of land resources. Direct payments should be set on the basis of specific and well-targeted environmental outcomes.*

Any recurrence of overgrazing can mean compulsory restoration by the farmers responsible. This is consistent with the polluter pays principle. According to the 1965

---

**Table 3.2 Numbers of grazing livestock**

('000 head)

	1980	1990	1998
Sheep	823	549	490
Cattle <sup>a</sup>	60	75	76
Horses	52	72	78

a) Dairy cows, heifers, steers, calves and beef cattle.

Source: Agricultural Society of Iceland; Statistics Iceland.

---

Soil Conservation Act and the 1986 Range Management Act, the SCS can impose grazing quotas if there is evidence of overgrazing. This has proved complicated and difficult to implement, however, and thus has seldom been tried. Furthermore, imposition of grazing quotas is not a preventive, but a last resort. *Livestock density should be regulated* based on the carrying capacity of soils. The first priority should be to restore good grazing land in the lowlands, where sheep should be relocated. In the highlands, grazing should be prohibited in sensitive areas (as defined by SCS soil erosion categories) and in the volcanic belt above 500 metres, to allow natural recovery of vegetation.

A project called “Woodlands for Reclamation” was launched in 1990, in co-operation between the SCS, the Forestry Service and the Icelandic Forestry Association, an NGO founded in 1930. Timber plantation has started in the eastern part of the country, where climatic conditions are more favourable. *Total wooded area increased* from 110 000 hectares in 1980 to 125 000 hectares in 1990 and 129 000 hectares in 1997. Some 1 100 hectares a year are being afforested. The objective is to increase the forest cover to 2% of the territory, or about 200 000 hectares. Farm forestry is encouraged through the 1995 Farm Afforestation Act and the 1997 Southland Afforestation Act. Again, any incentive to farmers should relate not to timber production, but rather to precise environmental objectives.

The 1991 National Soil Conservation Strategy contains a list of land reclamation projects; it has been implemented but does not provide a comprehensive approach to dealing with unsustainable grazing and land use. In 1997 the strategy was updated till 2000 with the Soil Conservation Programme, Goals, Approaches and Main Tasks. A new strategy is being prepared, to take effect in late 2000, and a bill on soil conservation is in preparation. The results of the 1990-96 soil erosion survey reinforced the need to *streamline policy objectives* and define quantitative targets for halting soil erosion, in terms of areas to be reclaimed, land area open for grazing and desired percentage of vegetation cover. For example, it is estimated that 60% of highland grazing should be stopped for soil conservation purposes. Less than 30% of the country has good or fairly good vegetation cover, whereas at settlement more than 60% was covered with open rangeland and woodlands (Table 3.3).

Erosion control has traditionally been considered a legal responsibility of the government, although farmers own or have grazing rights over most of Iceland. A process initiated in 1998 to delineate municipal land and clarify public land ownership and user rights in the highlands will create *new opportunities to protect fragile soils* (Chapter 3, Section 2.2). A charge could be introduced for grazing beyond the communal pastureland, so as to reduce overgrazing pressure in some municipalities. Private owners will be in a position to ask sheep farmers to pay for grassland

use. Alternatively, conservation easement contracts could be signed between the landowner and NGOs or government agencies. Under a proposal to revise the 1965 Soil Conservation Act, the SCS would produce a 12 year national plan to make land use sustainable. Local authorities would get more responsibility to monitor the state of soil and vegetation and to draw up their own plans for land management and reclamation, though these will need to be harmonised with the national plan.

The results of the 1990-96 soil erosion survey were made available to the public. A leaflet, "To Read the Land", was circulated in 1997 to all secondary schools. A booklet, "Horse Grazing Land", was released in 1997 to tell horse farmers about sustainable land use and grazing management issues. Such *information programmes should be further developed.*

Table 3.3 **Vegetation cover, 1994**

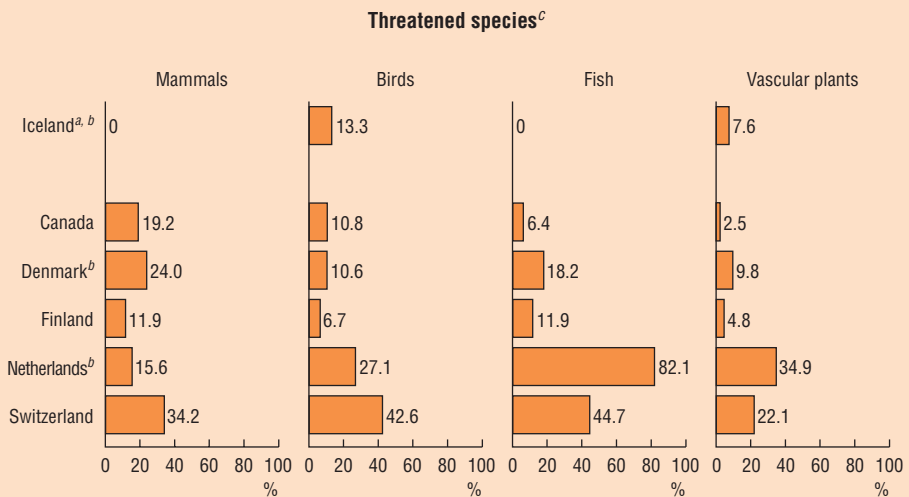
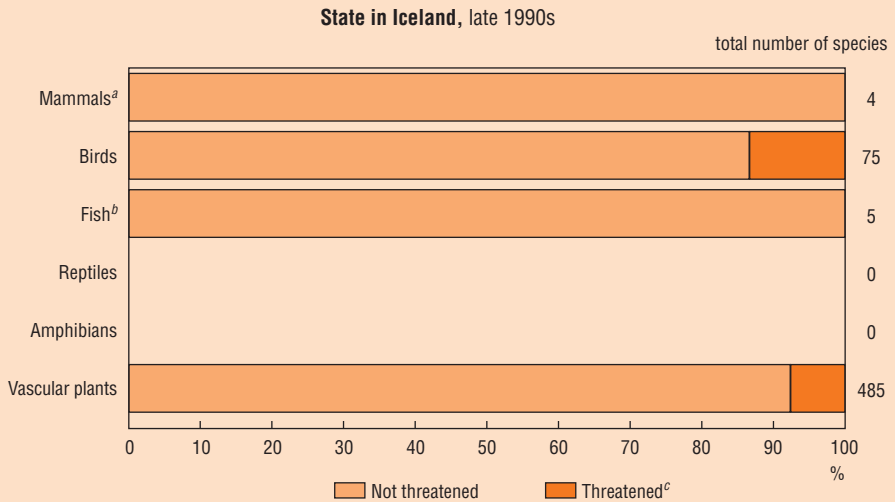
Category	Area (million hectares)	Area (%)
Good cover (> 75%) <sup>a</sup>	1.5	14
Fairly good cover (50-75%) <sup>a</sup>	1.4	14
Rather sparse cover (33-50%) <sup>a</sup>	1.6	15
Sparse cover (10-33%) <sup>a</sup>	0.8	8
Gravel, boulders, sand and lava	3.7	36
Glaciers, lakes and rivers	1.3	13
Total	10.3	100

a) Percentages within brackets refer to chlorophyll reflection.  
 Source: Icelandic Institute of Natural History.

## 1.2 Protecting nature and habitats

Iceland has *low diversity of animal species* (Figure 3.1). There are no reptiles or amphibians and only four wild terrestrial mammals, of which only the arctic fox is indigenous; the American mink and the reindeer were introduced long ago. All four species are common, even the arctic fox, whose extermination was encouraged by law between 1956 and 1994 to protect sheep in the highlands. Bird life is more diverse, with 75 nesting species, though 32 species are rare or extinct. A red list for birds was published in 2000. About 1 250 insect species have been recorded.

Figure 3.1 Fauna and flora



a) Terrestrial mammals; for marine mammals see Chapter 7.

b) Freshwater fish.

c) Categories "endangered" and "vulnerable" of the IUCN classification in % of known species; also includes species that may already be extinct but have been observed in last 50 years.

Source: OECD.

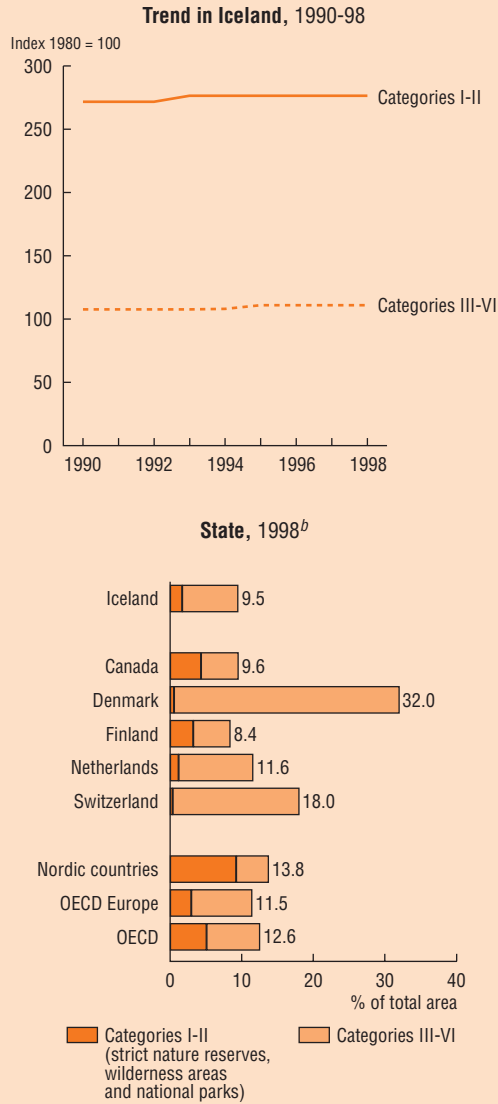
As regards *plant species*, a comprehensive 1995 biodiversity survey revealed 485 vascular species (including 100 introduced), 560 bryophytes and 510 lichens (which survived the last glaciation 10 000 years ago). A red list of endangered plants was recently published. Exotic species have been introduced, including around Lake Myvatn, a unique natural habitat surrounded by severely eroded areas. Afforestation with exotic coniferous trees, such as the Sitka spruce, is increasing. In an effort to protect Icelandic flora from interbreeding with imported species, the use of alien plant species was regulated in 2000.

Iceland's 82 *protected areas* account for 9.5% of its territory (Figure 3.2). Ten new protected areas were established in the 1990s, representing 54 100 hectares. Only one of the three national parks has a management plan. Iceland's second biggest bay, Breiðfjörur (10 000 hectares), with its many islands, was recently declared a protected area, and a lava field of 91 500 hectares on the Snaefellsnes peninsula will soon become the fourth national park. It was recently decided that the great glacier (Vatnajökull) and adjacent areas will become a national park in 2002; it will reportedly be Europe's biggest national park. This will double the part of the territory under protection. The *1999 Nature Conservation Act* defines the categories of areas subject to specific protection: areas of special biological value, areas with special or endangered species, key habitats and ecosystems, and areas for recreational uses. It also defines the types of landscapes that benefit from general protection: e.g. lava fields and volcano formations, lakes and hot springs. Access to protected areas (national parks, natural monuments, country parks) is open, although some restriction may apply to nature reserves. With enactment of the 1999 Nature Conservation Act, national parks can now be established on privately owned land. Proposals on defining and protecting wilderness areas were published in 1998.

Much of the area of Icelandic lowlands used to be *wetlands*. After the Second World War, the government supported large-scale draining of wetlands to convert them into grasslands. Since 1975, government support has progressively been reduced, and it was recently abolished. Some 3% of the lowlands in the south and 18% in the west are still natural wetlands. In 1999, a programme to reclaim wetlands was launched, in co-operation with NGOs.

*Efforts have been made to set up a modern legal and institutional framework for nature conservation.* The Nature Conservation Agency was created in 1997 to replace the less powerful Nature Conservation Council. Nature research centres run by municipalities are being established (two are operating, three soon will be and one is planned) to increase responsibility of local authorities in nature conservation. An office for the Conservation of Arctic Flora and Fauna was created in 1996 and the Stefansson Institute was opened in Akureyri in 1998. The 1994 Protection and



Figure 3.2 Major protected areas<sup>a</sup>

a) IUCN management categories; national classifications may differ.

b) Or latest available year.

Source: Statistics Iceland; IUCN; OECD.

Hunting of Wild Species Act transposes the 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats into Icelandic law. The Act makes hunting licences subject to an annual fee. The 1999 Nature Conservation Act takes into account many of the provisions of the EU's 1992 habitat directive and also covers landscapes. The Ministry for the Environment is to prepare nature conservation plans every five years, with the first such plan due by 2002. In the 1990s, Iceland ratified the Biodiversity and Desertification Conventions. A national strategy for the conservation of biological diversity is under preparation.

However, *the ranger staff is insufficient*, and the Nature Conservation Agency plans to lease the management of protected areas to private organisations fulfilling specific requirements. Iceland has no inventory or mapping of habitat types and has not defined priorities for protecting them. Consideration should be given to nature protection outside protected areas.

### 1.3 Conserving the central highlands

The central highlands, which cover about 40% of Iceland's territory (an area the size of Switzerland), are a major environmental and economic asset. They provide the natural resource base *needed by the agriculture, energy and tourism sectors*, and are thus *subject to related pressures* from animal grazing, construction of hydropower plants and electricity transmission lines, the growing number of domestic and foreign tourists and related heavy summer traffic, a proliferation of mountain huts, and increased off-road pressures from all-terrain vehicles and snowmobiles. The highlands furthermore constitute a *fragile ecosystem*, and they contribute directly to Iceland's essential character and its image as a country with a clean, unspoiled environment, a feature valued by its population and essential to its tourism industry. The problems in integrating the various objectives relating to nature conservation, agriculture, energy and tourism are compounded by the fact that *property rights* in the highlands are largely undefined; 34 municipalities have interests in the highlands and/or claim traditional user rights.

To achieve *sustainable development of the highlands*, Icelandic authorities have defined *framework conditions* for the area's development and protection (Chapter 3, Section 2.2). This framework includes the 1998 Municipalities Act and the 1998 Public Lands Act, which respectively determine municipal boundaries for the highlands and a process for defining land ownership and related rights up to 2007; and the 1993 Environmental Impact Assessment Act, the 1997 Planning and Construction Act and the 1999 Nature Conservation Act, respectively covering project assessment, infrastructure planning and concerns regarding nature conservation.

In 1999, the Ministry for the Environment approved a *Regional Plan for the Central Highlands*, running to 2015. It deals with protected areas, traditional uses (grazing, fishing, hunting), energy resources, tourism and recreation, development of the road system, and sanitation. Land is classified according to homogeneous landscape units and by different uses. A main feature of the plan is to concentrate development of major tourist infrastructure in the periphery of the highlands, leaving the heart of the area as untouched as possible. The plan identifies places for hydropower production. Roads would be kept to the minimum sufficient for summer traffic.

The regional plan, along with the above-mentioned Acts, forms the framework that *municipal and local land use plans for the highlands* must follow. After each general municipal election, the minister for the environment appoints a *joint committee for the central highlands* to make sure that municipal plans are consistent with one another and conform with the regional plan. The highlands have been subdivided among 34 *municipalities*, which have until 2007 to prepare their own municipal land use plans.

Over the 1990s, *tourism developed quickly* (Chapter 3, Section 2.3). In 2000, it was suggested that tourists pay a small fee to finance conservation at some sites. This opened up a debate on whether to apply the user pays principle or continue financing nature conservation at taxpayer expense. The 1994 Tourism Administration Act makes it possible to *require visitors to pay a fee for access to public areas*, provided the revenue is used to conserve the area, including through improved tourist facilities. This could apply to national parks and other protected areas, upon approval by the Nature Conservation Agency. For instance, entry fees could be collected from vehicles entering the main protected areas. Further efforts should be made to spread tourism demand both seasonally (e.g. winter sports) and geographically (e.g. health tourism in geothermal pools). To improve tourist behaviour, travel agents could distribute booklets including a code of good environmental practices to both Icelandic and foreign visitors.

*Development of hydropower* in the highlands, and conservation of the area, are among the most debated issues in the country. Iceland is unique among OECD countries in that two-thirds of its energy needs are met by renewable energy sources (hydro and geothermal); further use of these abundant energy sources is seen by many as the best way to develop and diversify the economy. But there is growing concern about nature conservation and its role as an asset for tourism. Furthermore, CO<sub>2</sub> emissions from industry will increase parallel to the increase in energy supply, making signature and ratification of the Kyoto Protocol even more difficult (Chapter 7). The government recently launched a process called “Man-Utilisation-Nature” to prepare a Master Plan for Hydro and Geothermal Energy Resources (Chapter 3, Section 2.4).

## 2. Focus on Selected Topics

### 2.1 Economic incentives for land reclamation

The SCS's tasks have traditionally been to replant denuded land and curb erosion, including by fencing the most threatened areas (3% of the territory). Since 1974, the SCS has had the legal power to enforce grazing quotas, which can lead to sequestration of animals, particularly horses. The 1990s saw a transition from a top-down approach on land reclamation to *grassroots and locally led projects on ecosystem management*. Farmers have been given increasing incentives to participate actively in land reclamation.

In 1991, the Ministry of Agriculture was given the authority to prevent farmers from buying quotas (mutton/lamb quotas had been introduced in 1985 to control supply in a context of depressed world prices) if the SCS determined their land could not support more stock. Until recently, farmers in sensitive areas (as defined by the SCS) were offered a *more generous buy-out for quotas* than others to alleviate grazing pressures on their land. Since 1991, the SCS has also provided farmers with 85% of the cost of seeds and fertilisers as part of the "*Farmers Heal the Land project*". Some 25% of sheep farmers, as well as a number of horse owners and other land users, participate. The project has had good results and has been an excellent tool to increase responsibility at the local level.

In 1992, *direct payments were introduced* for mutton and lamb production to replace a domestic price support mechanism that had amounted to consumer subsidies to wholesalers. Payments were initially based on output, within quota limits. Farmers producing less than the quota (with a minimum of 80% of the quota) were eligible for the full payment. This mechanism gave farmers some flexibility to undertake other activities, including land reclamation (tree planting and seeding). Since 1996, these direct payments have been totally decoupled from production levels and based on former quota entitlements; this has further increased farmers' choice of how to use state support.

It has been proposed that *direct payments* for sustainable grazing (in the form of a quality control bonus) be introduced by 2003. If approved by Parliament (an amendment of the 1993 Act on the Production, Pricing and Sale of Agricultural Products is necessary), these direct payments will replace part of the general subsidies to sheep farmers (from 12.5% in 2003 to 22.5% in 2007). They would be granted to farmers fulfilling criteria of sustainable land use, which have yet to be developed.

## 2.2 Legal framework regarding the central highlands

The central highlands have traditionally been seen as wasteland or wild land, offering little opportunity for development, except sheep grazing in some parts. They were not divided into municipalities, and even today *few property rights are defined* in the highlands, as no need for them was perceived. Increasingly, however, the highlands are seen in terms of their potential for energy production and tourism. Icelandic authorities have therefore defined framework conditions for the development and protection of the central highlands, adopting appropriate laws and planning tools.

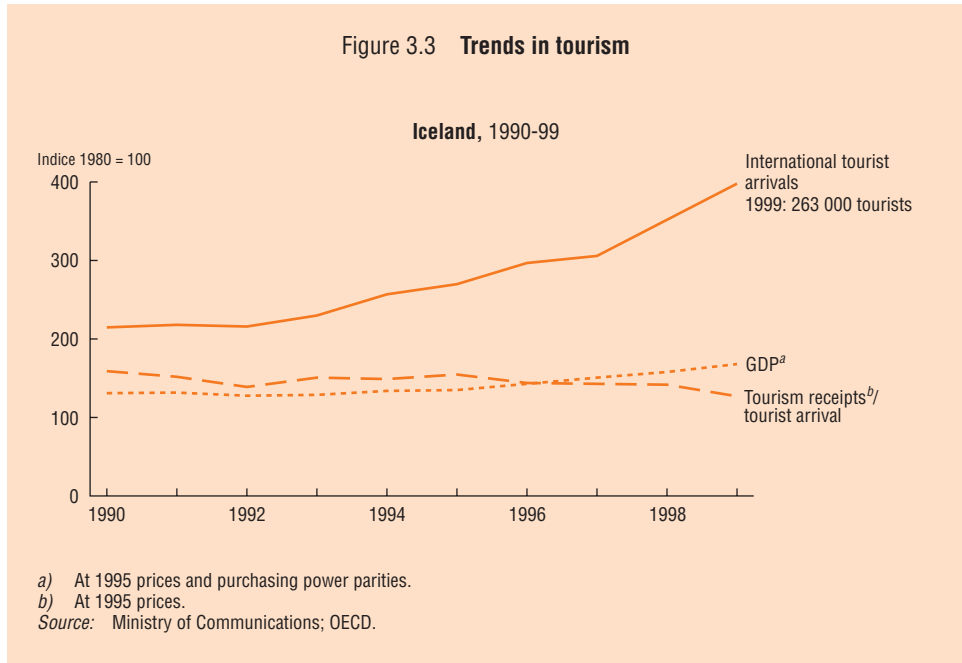
Stated government objectives have made clear that sustainable development in the highlands would greatly depend on *resolving land ownership issues*. Two important laws were adopted in 1998: the Municipalities Act, defining boundaries of municipalities for the whole country; and the Public Lands Act. The latter sets out ways to delineate private land, public land and upland range; in particular, lands where no ownership can be proved by 2007 will be state owned. On *private land*, *private ownership* concepts are defined according to the general provisions of the law. On *public land*, private individuals or legal entities have limited rights. *Upland range* is defined as land in uninhabited areas that has traditionally been used as summer pasture. Determination of property rights is based on a “bundle” of rights, some of which are amenable to separate treatment, which thus keeps open the possibility of using contractual tools to manage local development projects or sheep grazing in the highlands.

The sustainable development option that Iceland has identified for the highlands includes: i) the *building of hydropower plants*, in particular to supply electricity for aluminium production; ii) the *development of tourism*, with the concomitant need for transport infrastructure and accommodation, and iii) the *protection of nature*, in perhaps the only large wilderness area left in Europe (this would entail, for instance, an end to unregulated summer housing development). The 1998 vPlanning and Construction Act, the 1999 Nature Conservation Act and the 2000 Environmental Impact Assessment Act together complete the legal framework for construction in and protection of the highlands.

## 2.3 Pressures from tourism

*Tourism in Iceland developed rapidly* in the 1990s (Figure 3.3). Foreign arrivals increased from 140 000 in 1990 to 260 000 in 1999 and are expected to reach 500 000 within the next 20 years. The level of tourism receipts per tourist arrival was fairly stable in the 1990s. The number of Icelandic tourists is also considerable,

Figure 3.3 Trends in tourism



accounting for nearly 30% of total overnight stays. Tourism accounts for 4% of GDP and 5% of employment.

However, *summer tourism puts increasing pressure on fragile sub-arctic ecosystems*. Iceland's unique natural scenery, open wilderness, natural parks and fishing are the chief tourism attractions. Tourism policy objectives include free access to the whole country and ensuring that the operation and development of tourist facilities do not degrade the natural environment. The Icelandic Tourist Board has provided financial support for building tourist facilities in national parks, nature reserves and other frequently visited areas. The Nature Conservation Agency, with 35 summer rangers, protects natural reserves as a tourism asset.

Icelanders and tourists increasingly use all-terrain vehicles, which can damage vegetation cover and provoke soil erosion. This trend is likely to continue, as rental rates for vehicles are expected to decrease as a result of tax reform. In 1998, it was decided that off-road driving could eventually be banned throughout the volcanic belt of the central highlands and restricted in less sensitive areas. Regulations on off-road driving were made more stringent in 1999, and such driving is now banned throughout Iceland. The building of huts and smaller facilities for tourists is now subject to planning and permits. Farm tourism is marginal (approximately 140 farms involved,

out of 2 000). Tourism promotion efforts have focused on developing lodging, which meets a set minimum of quality standards, at the periphery of the highlands to serve as a base for day tours within the highlands. The Icelandic Tourist Board was consulted during preparation of the Regional Plan for the Central Highlands.

#### *2.4 Master plan on hydro and geothermal energy*

Iceland has *extensive hydro and geothermal energy resources*. It is estimated that only 10-15% of these resources are being exploited. The trend in the 1990s was to reduce the number of small private power plants and build larger public plants. A new dam was built in 1996, after approval of an environmental impact assessment (EIA). About 90% of Iceland's electricity comes from 28 major hydro plants. The remaining 10% comes from geothermal plants. The share of the private sector in energy production is negligible.

*Public debate* has resulted from a recent proposal to build a dam and hydro plant in the eastern part of the highlands to supply energy to aluminium smelters planned for north-eastern Iceland. The site originally proposed (Eyjabakkar) is a wetland with high diversity of flora, a moulting ground for birds including the pink-footed goose, and a grazing area for reindeer. The dam was to be exempt from EIA according to a provision in the 1993 EIA act. However, plans for that dam have been postponed and a new site was proposed in the eastern highlands (Kárahnjúkar), which will undergo EIA. There is still a lively debate on the future of the eastern highlands, with some favouring protection of the area as a national park and others supporting the use of its energy potential to develop industry and help reverse a decline in the local population.

In response to these concerns, the government in 1999 launched the preparation of a *Master Plan for Hydro and Geothermal Energy Resources* under a steering committee established by the Ministry of Industry and Commerce and the Ministry for the Environment. The master plan will be based on the best available scientific information. One hundred energy project proposals identified by the National Energy Institute will be evaluated. The steering committee expects to finish evaluating the first 25 project proposals by the end of 2002. Projects will be judged on the basis of: profitability, benefits to the economy, impact on the environment, employment and regional development. Four working groups have been established, dealing with: nature, landscape and cultural heritage; grazing and other traditional land uses such as fishing and hunting; economic development, employment and regional development; and projects' economic efficiency. To facilitate public participation, an environmental NGO called Landvernd has established a forum for discussion and information exchange. All projects will undergo EIAs.

Part II

**SUSTAINABLE DEVELOPMENT**



# 4

## ECONOMY AND THE ENVIRONMENT\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- translate national sustainable development commitments into *integrated policies and programmes* in key economic sectors (e.g. fisheries, agriculture, energy, transport and tourism), with targets and timetables;
- further implement mechanisms to encourage *better interministerial co-ordination and co-operation* related to sustainable development;
- review the environmental effects of the *tax system*, integrate environmental concerns in fiscal policies and expand the use of economic instruments for environmental management;
- further increase public and private *environmental expenditure* so as to expand environmental infrastructure, implement national laws and translate international commitments into reality;
- encourage private companies to improve *environmental management standards*, and implement “Environment Policy in Government Operations”.

---

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993. This chapter also takes into account the latest OECD economic surveys of Iceland.

## 1. Evaluation of Performance

### 1.1 Sustainable development: decoupling of economic growth from environmental pressure

Iceland has achieved a high rate of economic growth, averaging 4.5% a year since 1994 (Chapter 4, Section 2.1). Over 1990-97 some weak decoupling of economic growth from environmental pressure occurred. Emissions of CO<sub>2</sub>, SO<sub>x</sub> and NO<sub>x</sub> continued to grow, but more slowly than GDP. Energy use grew as much as GDP. Water withdrawal and municipal waste continued to grow in the 1990s.

Iceland is a sparsely populated country with significant livestock production and energy-intensive industry, and relatively high emissions from transport and fisheries. By unit of GDP or per capita, the intensity of pressure is high. Per square kilometre, the density of pressure is low. Some emerging *environmental pressures* do not show up in long-term national trends, including increases in urban traffic and related episodes of air pollution, and effluent from fisheries and agriculture.

### 1.2 Sustainable consumption and production

In February 1997, the government adopted a policy paper entitled “*Environment Policy in Government Operations*”. The policy includes principles related to waste minimisation, preference for environmentally sound goods and services, and maximum recycling and reuse. Areas covered are procurement, paper use, office equipment, use of information technology, chemicals and cleaning, packaging and recycling, energy use, buildings (design, building and repairs), transport, participation and education. The Ministry for the Environment published an information brochure on *green procurement* in 2000 (Chapter 5, Section 1.3).

However, the *environmental management* industry in Iceland remains weak. There is little government pressure on private companies to set objectives for environmental performance or to show results. Implementation of “*Environment Policy in Government Operations*” remains weak and staff awareness low. A comprehensive, systematic approach to this issue is needed.

### 1.3 Sustainable development: institutional integration

#### *Strategic planning*

In 1993, the government adopted a *National Environmental Strategy called “Towards Sustainable Development”*. It includes qualitative objectives for atmosphere

and ocean protection, natural resource management, conservation of habitats and of flora and fauna, waste management, historical monuments and natural heritage, and international co-operation. The strategy also proposes a broadening of the range of policy instruments, improvement of environmental protection, sustainable management of natural resources and key sectors, and participation in international environment activities. The government established seven committees to translate the strategy into an action plan; this was not completed until after a change of government in 1995.

In 1997, the government adopted a *National Sustainable Development Action Plan*. It covers agriculture, fisheries, industry, energy, fresh water, mining, transport, tourism, waste management, regional development and environmental education. The plan contains over 200 individual provisions. Most are aimed at central government and local authorities, while others are addressed to industry and NGOs. Some are specific instructions for action, others are more general policy guidelines. The plan does not include quantitative commitments.

In 1999, the minister for the environment signed and adopted a comprehensive, long-term *Regional Plan for the Central Highlands*. This followed five years of work, including public consultation. The plan covers all major human activities in the highlands up to 2015, and provides for the conservation of large parts of the area, with roads, power lines and dams concentrated in relatively narrow belts. Individual municipalities will have to finalise land use plans before 2007, as specified in the 1998 Public Lands Act.

An integrated master plan for hydro and geothermal energy is being prepared, taking account of economic, social and environmental considerations, and including public consultation. A waste plan for tourism is also in preparation. The development of these plans has contributed to an increase in awareness about environmental issues in Iceland.

However, *implementation remains at a relatively early stage*. The 1993 and 1997 sustainable development plans are largely statements of intent. Targets and timetables to provide a basis for action and performance assessment, and systematic monitoring, review and evaluation mechanisms, have not been developed. Implementation of sustainable development plans and principles, such as the polluter pays and user pays principles, has been patchy.

#### *Sectoral integration: fisheries*

The national strategy and policy on conservation and sustainable use of living marine resources are stated in Icelandic legislation and the National Sustainable Development Action Plan. A fishery management system, including *individual*

*transferable quotas*, has been implemented and marine conservation zones have been established. No direct subsidies are granted to support fishing and fish processing. Annual transfers associated with fishery policies amount to some ISK 2 billion, mainly in the form of income tax concessions for fishers (70%) and to finance the Marine Research Institute (30%). Iceland's fisheries are promoted as clean, but little *integration of environmental concerns* in fishery management (e.g. regarding CO<sub>2</sub> emissions from fishing or effluents from fish processing) has taken place (Chapter 6). Moreover, VAT on diesel fuel is refunded.

The National Environmental Strategy sets a *range of objectives* for the fishery sector, including maximising the sustainable yield of fish stocks, promoting environmentally sound fishing equipment and better catch utilisation, and reducing oil consumption. Detailed fishery management planning is well in place and underpinned by legislation. Tradable fishing rights established for key fisheries have led to sustainable yields and good economic returns. There is scope to improve efficiency and to further support the fishery management system by introducing a more competitive allocation of quotas. Fishery management could also be improved through *greater integration of environmental issues*, including further efforts to reduce *emissions* (e.g. CO<sub>2</sub>) and *effluent* (Chapter 6).

#### *Sectoral integration: agriculture*

Agriculture has led to a number of *environmental problems*: major loss of vegetation cover and soil erosion; and major wetlands drainage, affecting breeding grounds for waterfowl and other species. Nevertheless, *support to Icelandic agriculture* remains among the highest in the OECD, with a 68% producer support estimate (PSE) in 1997-99 (Chapter 3). Since 1996, a declining trend in PSE and the consumer subsidy equivalent has reversed: budget payments to producers rose by nearly 6% in 1998, over 1997. Annual transfers from taxpayers amount to some ISK 7 billion. Agricultural support has been based on economic and social considerations, and environmental problems have been addressed separately, for example by the government soil conservation programme. A contract between sheep farmers and the government regarding government support until 2007 has recently been signed, but legal revision is needed to include payments for positive environmental outcomes: from 2003, farmers who can prove sustainable land use would receive more support than others (Chapter 3).

There is *no comprehensive plan for sustainable agriculture*, although the National Sustainable Development Action Plan includes a chapter on agriculture. The National Environmental Strategy undertook to restrict grazing to areas where it would not damage the land, and to encourage people who left farming to increase their involvement in conservation activities. *Agricultural subsidies* have been replaced by income support measures, and the size of future payments is to be linked to land reclamation.

*Sectoral integration: energy*

Most of Iceland's energy needs are met by hydropower and geothermal energy (66%). The proportion of energy obtained from oil is relatively small (31%). Hydro and geothermal energy are renewable, and much less polluting than fossil fuels, but environmental impacts arise from flooding, construction of large structures and distribution systems. There is no comprehensive sustainable energy plan other than the energy chapter of the 1997 sustainable development plan, though the Ministry of Industry and Commerce is preparing a "Master Plan for Hydro and Geothermal Energy Resources", in co-operation with the Ministry for the Environment. The plan will include evaluation and categorisation of many projects, based on economic, social and environmental considerations. In 1998, the Ministry of Industry and Commerce, the Energy Fund and the Rural Development Agency launched a programme to increase the use of geothermal water, and in 2000, ISK 760 million was granted to the National Energy Authority to find new geothermal sources.

Power-intensive industries such as aluminium production receive electricity at much lower prices than do domestic consumers (Table 4.1). Prices for aluminium producers are tied to international aluminium prices; the reason given for this policy is that these industries take long-term supplies at relatively high voltages.

Table 4.1 **Energy prices in selected OECD countries, late 1990s**

		Electricity		Oil		Road fuel <sup>e</sup>	
		Industry (USD <sup>a</sup> /kWh)	Households (USD <sup>a</sup> /kWh)	Industry (USD <sup>a, c</sup> /toe)	Households (USD <sup>a, d</sup> / 1 000 litres)	Diesel	Unleaded premium gasoline
Iceland	General	0.08	Urban 0.07	231	260	0.20	0.90
	Power intensive	0.01	Rural 0.11				
Netherlands		0.06	0.13	189	419	0.59	1.01
Switzerland		0.10	0.10	..	153	0.50	0.59
Denmark		0.07	0.17	..	556	0.49	0.80
Finland		0.05	0.09	144	288	0.53	0.95
Canada		0.04	0.07	115	323	0.44	0.48 <sup>f</sup>

a) At current exchange rates.

b) At current Purchasing Power Parities.

c) High-sulphur oil.

d) Light fuel oil.

e) At 1995 prices and Purchasing Power Parities.

f) Unleaded regular gasoline.

Source: National Energy Authority; IEA- OECD.

### *Sectoral integration: transport*

Iceland does not have road traffic problems of the magnitude of most OECD countries, but problems are growing, especially around Reykjavik. Motor vehicle ownership and use are growing rapidly. *Emissions* of air pollutants from road traffic are rising, and are fairly high in relation to other OECD countries; sea and air transport emissions are also rising. Iceland has the second highest per capita NO<sub>x</sub> emissions and the third highest per capita VOC emissions in the OECD. Diesel fuel is not subject to excise taxes, though annual taxes on diesel cars are higher than those on gasoline cars (Chapter 4, Section 2.2). A differentiated excise duty is levied on new vehicles at the time of purchase, which favours lighter (more fuel efficient) vehicles. However, the excise duty was recently reduced for the largest cars (Table 4.3). There has been no attempt to estimate the congestion or emission externalities of transport and to apply measures, such as taxes or other economic instruments, to correct them.

There is *no comprehensive plan for sustainable transport*, though the sustainable development action plan includes a transport chapter. Environmental performance in the transport sector would be enhanced by greater incentives for *diesel fuel efficiency*. Current taxation arrangements for diesel fuelled motor vehicles provide a negative incentive. Measures such as *fees for road use and parking* could be considered as a means of responding to motor vehicle emissions and encouraging public transport.

### *Sectoral integration: tourism*

Annual foreign *tourist arrivals* nearly doubled in 1990-99 from 142 000 to over 263 000. Environmental pressures exerted by foreign and domestic visitors are expected to continue increasing rapidly. They are concentrated both seasonally and geographically; more than half the visitors arrive in June, July or August. Popular tourist sites include nature reserves and conservation areas, many of which are ecologically sensitive; some of these sites are particularly heavily visited, including Gullfoss, Geysir, Lake Myvatn and Thingvellir. The use of all-terrain vehicles and snowmobiles in sensitive and/or remote areas has posed particular concerns (Chapter 3).

*No comprehensive plan for sustainable tourism* has been elaborated other than the tourism chapter in the sustainable development action plan. Codes of *good environmental practice* could be implemented, in co-operation with tourism operators. *User fees* could be charged for entry into national parks, access to popular sites and camping in ecologically sensitive areas; such fees could help meet the costs of facilities at popular sites and reflect the environmental costs of tourism.

*Sectoral integration: industry*

A number of factors are favourable to greater attention by *industry* to environmental concerns. These include recent strengthening of environmental law, rapid dissemination of new technologies and increasing consumer awareness nationally and internationally. Yet the *environmental management* industry in Iceland remains weak. Generally private sector knowledge of new environmental law is poor, and laws are not fully enforced. There is little government pressure on private companies to set objectives for environmental performance, or to show results. The government is not promoting material efficiency and little has been done to promote energy efficiency.

*Other institutional mechanisms*

A *Parliamentary Environmental Committee* provides a mechanism for integrating environmental and economic policy in the decisions of the Althing (Parliament), but it considers only new environmental laws and policy issues.

The Ministry for the Environment, which is responsible for *co-ordinating sustainable development* policy between ministries at the national level, holds periodic co-ordination meetings with key ministries. However, the Ministry of Finance and the Ministry of Industry and Commerce are primarily concerned with economic development and have little environmental expertise. Nor is there much economic expertise within the environmental administration, though it would be useful in, for instance, co-ordinating with other agencies on the use of economic instruments, and on other economic issues where the environment is of increasing importance (e.g. trade, investment, competitiveness).

Mechanisms for *integrating environmental policies* with economic policies thus require strengthening. Joint implementation of sectoral sustainable development policies by key ministries, including the Ministry for the Environment, could promote co-ordination and efficient use of scarce resources. Mechanisms to increase accountability for sustainable development could be considered, such as annual progress reports by ministries to the Althing on implementation of their sustainable development plans.

The Ministry for the Environment/Federation of Local Authorities *Local Agenda 21* programme is a useful initiative and could be extended beyond the current 31 municipalities (Chapter 5). More systematic co-ordination and consultation between ministries and *other stakeholders* is also required. The role of Landvernd, an NGO, in overseeing public involvement in assessing energy projects is an interesting model.

### 1.4 Sustainable development: market integration

A number of *economic instruments with specific environmental purposes* have been introduced, including hazardous waste charges, a deposit-refund programme for packaging and a hunting fee (Table 1.2). Opportunities exist to improve and *extend the use of such economic instruments*, especially to address environmental effects of the transport and tourism sectors. Increased water charges could be considered to cover the costs of infrastructure and metering, and the hazardous waste charge could be extended to a wider range of waste. Prices for water supply, compared with those in other countries, are low (Table 2.5).

The 1993 National Environmental Strategy provided for increased use of *economic instruments* to promote improved energy efficiency in the transport sector, a shift from fossil fuels to renewables and conservation cost sharing by the tourism industry. *Policy on taxation*, e.g. fuel and vehicle taxes, has generally been developed without taking account of environmental issues (Chapter 4, Section 2.2). Gasoline is taxed at a relatively high rate but diesel fuel is not taxed at all, except for VAT. Nor are there any instruments to encourage greater efficiency in the use of diesel fuel by motor vehicles and fishing vessels, or to reflect the externalities arising from diesel emissions (NO<sub>x</sub> and VOC in particular). Consideration should be given to introducing an excise tax on diesel fuel and adjusting motor vehicle excise taxes to further encourage the use of energy efficient vehicles.

Findings of research by Ministry for the Environment and the Ministry of Finance on the introduction of economic instruments in the field of the environment need to be acted upon.

### 1.5 Environmental expenditure

Pollution abatement and control (PAC) expenditure is estimated to have been just 0.4%-0.5% of GDP in 1998 (Chapter 4, Section 2.3). While this reflects the relatively low level of pollution in Iceland, environmental expenditure (i.e. PAC, water supply and nature protection expenditure) needs to be increased to address growing environmental management challenges (e.g. waste management) and to implement environmental laws (e.g. on nature protection) and translate international commitments into realities (e.g. regarding waste water treatment). Iceland's sanitation infrastructure (e.g. recycling facilities, waste incinerators and landfills, waste water outfalls and treatment plants) needs to be modernised or established. Requirements for environmental expenditure and associated financing needs could be reduced through preventive and integrative measures to avoid pollution and environmental degradation.



The transposition into Icelandic law of *EU directives*, and the implementation of these laws, are major drivers for improved implementation of environmental policy. However, the related knowledge and enforcement are weak, and require action from the Ministry for the Environment, its agencies and the municipalities. There is potential for further cost recovery for environmental services provided by government agencies and municipalities, consistent with the *polluter pays* and *user pays principles*.

Besides central and local government funding, new and innovative sources of *financing* may need to be developed. Among possible additional sources are: i) increasing reliance on *service charges* for publicly provided environmental services; ii) mobilising private enterprise and households to make *voluntary contributions* to environmental causes; and iii) tapping international sources such as the Nordic Investment Bank or private capital funds favouring *green technologies*.

## 2. Focus on Selected Topics

### 2.1 Major economic trends

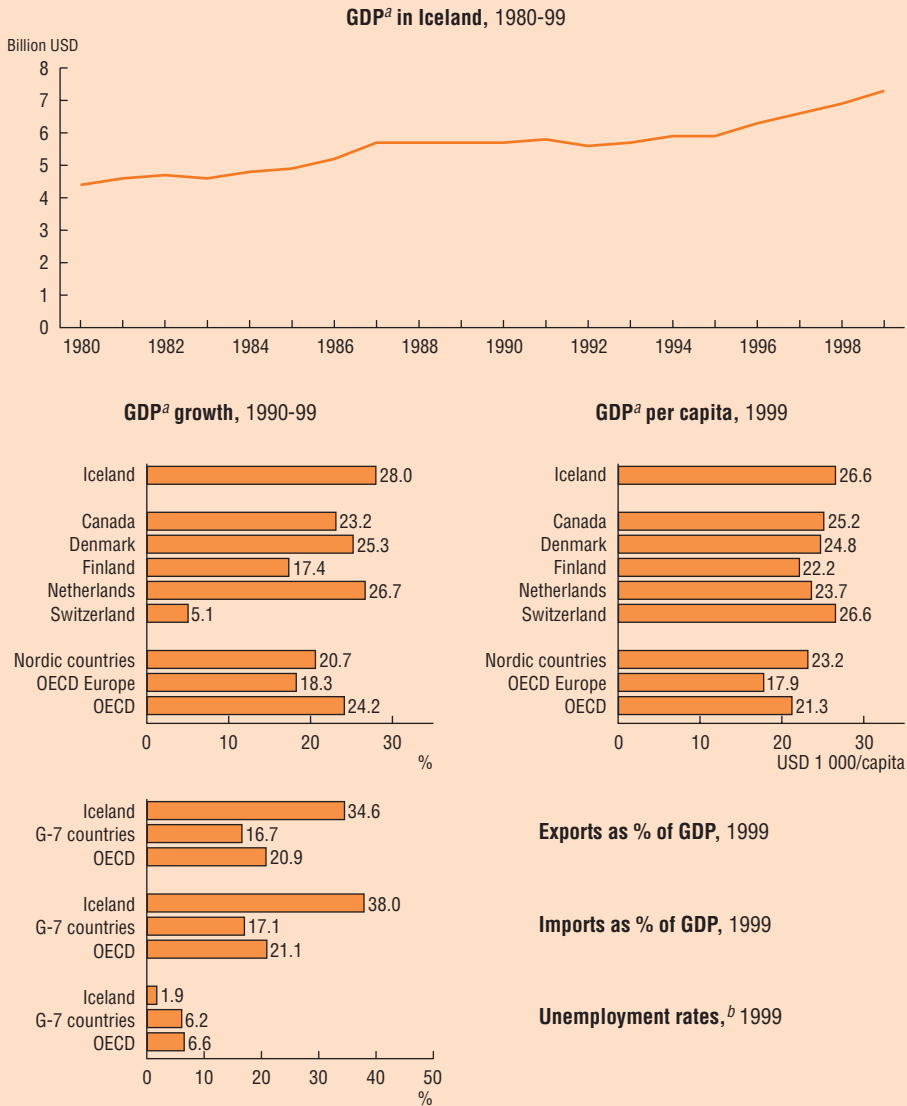
Iceland's economy and population are both growing faster than the OECD averages. Iceland's *economic growth has averaged 4.5%* in real terms since 1994 (Figure 4.1). However, the pace of expansion is likely to slacken because of growing inflationary pressures, falling competitiveness and consequent adjustments to policy.

The economy is dominated by the service sector, at 74% of GDP, but primary industries, at about 10%, account for around four times the OECD average, with manufacturing at 16% (Table 4.2). Tourism's share of GDP was 4.5% in 1999. *Iceland's exports* depend heavily on its rich endowments of *natural resources*. *Fishing and fish processing* accounted for about half of total exports in 1998. The two other most prominent exports were tourism (13%) and *aluminium and ferrosilicon* (11%). Aluminium and ferrosilicon plants rely on hydropower generation, and tourism is based directly on Iceland's natural amenities.

### 2.2 Taxes and subsidies

Taxes and subsidies that affect the environment can be divided into instruments for environmental policy (Table 1.2) and instruments for other purposes that have environmental effects (Table 4.3). Concerning the former, Iceland has no environmental taxes per se, but *environmental tax concessions and subsidies exist*, although not applied as widely as in the other Nordic countries. A high rate of duty helped

Figure 4.1 Economic structure and trends



a) GDP at 1995 prices and purchasing power parities.

b) % of total labour force.

Source: OECD.

accelerate the phasing out of leaded gasoline; now only unleaded gasoline is sold in Iceland. There is no excise duty on cars exclusively fuelled with hydrogen or electricity, and duty is reduced for cars with hybrid (fuel plus electricity) engines. There are subsidies for work to combat soil erosion. Following two big avalanches that caused 34 deaths in 1995, an avalanche fund was created in 1998 with revenue from a tax on property. The fund is used to finance infrastructure to protect houses in avalanche-prone areas.

The government has undertaken to enact green tax reform to strengthen the adjustment of consumption, sectoral developments and the economy as a whole to the principles of sustainable development. The Ministry for the Environment and the Ministry of Finance have published three studies on the feasibility of further

**Table 4.2 Change in GDP, sectoral trends and environmental pressures**

	(%)	
	1980-98	1990-98
<b>Selected economic trends</b>		
GDP	58.3	20.8
Population	20.0	7.5
GDP/capita	31.9	12.4
Total primary energy supply	58.6	11.1
Road traffic <sup>a</sup>	98.9 <sup>b</sup>	3.4 <sup>c</sup>
Tourism receipts <sup>d</sup>	5.1	1.5
Fisheries <sup>e</sup>	31.5	5.8
<b>Selected environmental pressures</b>		
CO <sub>2</sub> emissions <sup>f</sup>	25.7 <sup>b</sup>	8.1 <sup>c</sup>
SO <sub>x</sub> emissions	9.6	6.2
NO <sub>x</sub> emissions	34.7	8.9
Municipal waste generation	..	9.4 <sup>g</sup>
Water withdrawals	47.2 <sup>b</sup>	..
Fish catches	45.6	46.5

a) Based on values expressed in vehicle-kilometres.

b) 1980-97.

c) 1990-97.

d) International tourism receipts.

e) Value of fishery exports at 1995 prices.

f) From energy use, excluding marine bunkers.

g) 1992-97.

Source: OECD.

Table 4.3 Environmentally related taxes and subsidies, 2000

Instrument	Details	Comments
<b>A. Taxes and duties</b>		
VAT		
Subsidised rate on electricity for space heating	VAT charged at 14% (general rate 24.5%)	
No VAT charged on public transport		
Gasoline tax	General excise ISK 10.50/litre Special excise ISK 28.60/litre	A higher tax on leaded gasoline speeded its phasing out. VAT is applied to the selling price of gasoline and diesel fuels. Revenue: ISK 1 975 million 1999.
Taxes on motor vehicles:		
Excise duty on purchase <sup>a</sup>	30%, engine 0-2 000 cm <sup>3</sup> 45%, engine over 2 000 cm <sup>3</sup>	Upon importation of motor vehicles, VAT applies to the customs value plus the excise duty. No excise duty on vehicles for public transport. Revenue: ISK 4 257 million 1999.
Weight tax, gasoline fuelled vehicles	ISK 6/kg for the first 1 000 kg, ISK 8.10/kg between 1 000 and 2 000 kg, ISK 2/kg above 2 000 kg Minimum of ISK 3 000 Maximum of ISK 36 200	Taxation period is every 6 months. VAT is not applied to the weight tax.
Weight/distance tax, diesel fuelled vehicles	For vehicles up to 4 tonnes, either ISK 7.11/km driven or a fixed annual tax depending on weight: ISK 94 273 (less than 1 tonne) to ISK 214 865 (4 tonnes) For other vehicles, from ISK 7.11/km driven (4 to 5 tonnes) to ISK 31.94/km driven (more than 31 tonnes)	VAT is not applied to the weight/distance tax or to the fixed annual tax. Tax concessions for public transport vehicles. Revenue: ISK 3 541 million 1999.
Concessional duties		
Zero duty for electric or hydrogen fuelled cars		
Reduced duty for hybrid cars	ISK 120 000	
<b>B. Subsidies</b>		
Subsidy to stop soil erosion and for revegetation of degraded land		ISK 236 million (including all government expenditure in this area).
Use of electricity for space heating		ISK 600 million 1999.

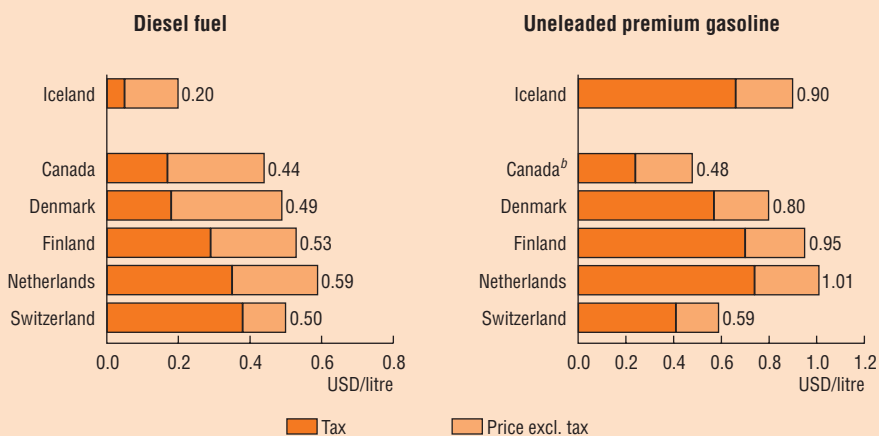
a) The excise duty for engines over 2 000 cm<sup>3</sup> was 60% until 1999.

Source: OECD; UNFCCC.

introducing *economic instruments in the field of environment*, but the results have not been implemented yet.

Concerning environment-related taxes, a number of taxes in Iceland have environmental effects (Table 4.3). Gasoline prices and tax rates are relatively high, but between low *diesel* fuel prices (they are at the lower end of the OECD price range), the lack of excise tax on diesel fuel and weight-based motor vehicle excise taxes, there is little incentive for diesel fuel efficiency (Figure 4.2). Owners of diesel-powered motor vehicles must pay a weight/distance tax, based on both vehicle weight and kilometres driven (which must be metered). Owners of diesel vehicles under four tonnes can instead opt for a flat-rate tax based only on vehicle weight. Under the first option, vehicles pay more the more kilometres they travel, which is an incentive for fuel economy. Under the second, vehicles pay a larger weight tax but no distance tax, and thus there is no built-in incentive for fuel economy. At a certain threshold level it becomes profitable to pick option two. The annual threshold varies according to the size of the vehicle; for example, 30 000 kilometres for a four tonne, four-wheel-drive vehicle, and 45 000 kilometres for a 10 tonne truck.

Figure 4.2 Road fuel prices,<sup>a</sup> 1999



a) At 1995 prices and purchasing power parities.

b) Unleaded regular.

Source: National Energy Authority; IEA-OECD.

### 2.3 Environmental expenditure and financing

In 1998, *public PAC expenditure* was estimated at 0.4% of GDP. Expenditure on waste water (virtually all of it investment expenditure) accounts for 30% of the total, and expenditure on waste (essentially operating expenditure) for 70%. Private expenditure has not been documented, but it is thought to be low by international standards.

*Financing of environmental expenditure* is dominated by the public sector (Table 4.4). The funding comes from budgetary sources, water supply pricing, waste water charges and waste charges. The government and a number of municipalities are

Table 4.4 **Pollution abatement and control expenditure, 1998**  
(million ISK)

	Water		Waste		Other <sup>a</sup>	Total	Share of GDP (%)
	Investment	Operations	Investment	Operations			
National government	114	0	–	118	–	232	
Local government	456	150	27	1 573	–	2 206	
Private	..	..	..	..	–	..	
Total	570	150	27	1 691	–	2 438	0.4

a) Air and noise related expenditure.

Source: Ministry for the Environment.

Table 4.5 **Budget for the environment, 1996-2000**  
(‘000 ISK)

	1996	1997	1998	1999	2000 (estimate)
Ministry for the Environment, net expenditure <sup>a</sup>	977	1 073	2 076	2 135	2 321
Environmental projects	1 124	1 148	1 212	1 321	1 383
Total environmental expenditure	2 101	2 221	3 288	3 456	3 704
Total government expenditure	136 978	134 586	189 636	182 376	193 159
Environment/Total	1.5%	1.7%	1.7%	1.9%	1.9%

a) Excluding earmarked revenue.

Source: Ministry for the Environment.

attempting to increase user funding: the hazardous waste fund is an example of this approach. The national budget for environment has risen gradually as a percentage of total government expenditure and now stands at 1.9% (Table 4.5).

There is no evidence that environmental expenditure has reduced national economic growth or overall *competitiveness* in the private sector. The traditional criteria for competitiveness, based on price and quality, have been joined by eco-competitiveness, or the degree to which an industry can respond to environmental requirements and take advantage of them. For example, Iceland has capitalised on its endowments of renewable resources and natural amenities to attract overseas investment and visitors.

# 5

## ENVIRONMENTAL/SOCIAL INTERFACE

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- improve public *access to environmental information* by publishing periodic *state of the environment reports*, environmental data and indicators showing the progress made towards goals and targets;
- regularly carry out national surveys of public *environmental awareness*, and build consensus about environmental policies and their implementation;
- develop the use of environmental information and economic instruments to provide appropriate *signals to consumers*;
- further research the *social consequences of the fishery management system* and develop the decision making process so as to achieve the social objectives of sustainable fishery management;
- adopt a new *national plan for sustainable development*, with economic, environmental, social and regional dimensions, a long-term perspective and appropriate objectives and targets, based on extensive consultation;
- adopt a *national spatial plan on land use*, co-ordinated with the sustainable development plan.

### 1. Evaluation of Performance

This chapter reviews Iceland's environmental performance in a social context (Chapter 5, Section 2.1). Focusing on the environmental/social interface, the following



areas are of particular interest: environmental justice, environmental democracy (information and participation), environmental awareness and education, and consumption.

### *1.1 Environmental justice: distributional issues*

#### *Fishery management system*

The Fishery Management Act of 1990 contains three major goals: *sustainable yield* and conservation of fish stocks over the long term; *maximising benefits* for the country and optimising economic efficiency of fisheries; and *ensuring fairness* among individuals and maintaining local communities in the various regions, while encouraging full employment and a stable population. The most attention has gone to conserving fish stocks and optimising economic efficiency; *less attention has been paid to the social and environmental dimensions* (Chapter 6, Section 1.3). The degree of importance attached to the social dimension of the fishery management system and the degree of integration between social policies and fishery policies are unclear.

Traditionally, coastal fishing communities fully or partly owned the local fish processing facilities. A high degree of integration existed between harvesting and processing. Relatively *small harvesting/processing companies* were distributed along the coasts; typically, each village had one processor dependent on its fishing fleet. Today, however, the local harvesting-processing link has been weakened (except for herring and capelin) for a number of reasons, including the rise of auction markets for fish over the last 15 years. With the introduction of the individual transferable quota (ITQ) system, quotas have “migrated” among regions. *An increasing amount of fish is processed on board fishing vessels*, further reducing supply of raw material to land-based processing installations. Vacancies left open by the migration to the Reykjavik area of local labour force in processing plants have been filled by new migrants. There are also positive developments from the point of view of local communities, such as the growth of the market for “flying fish” (exported fresh by air) and the flexibility provided by quota trading.

Both the fishing and processing parts of the sector have become more concentrated. Fishing quotas are in the hands of a smaller number of firms: 561 firms in 1999, down from 1 071 in 1991. Employment in fishing and fish processing decreased by 12% between 1990 and 1998. In December 1998, the Supreme Court ruled that regulations limiting fishing quotas to vessels with prior experience violated the constitutional right to equal access to *employment*. Examination of the distribution of landing and quota holding by size of fishing village indicates that the *smallest villages are losing* against larger villages, and that medium-sized villages are gaining against the larger ones.

A committee appointed by the Ministry of Fisheries was set up in 1999 to evaluate the future of the management system and address the distribution aspects involved in quota allocations. Further *analysis* is needed on the social implications of the fishery management system before adjustments can be made to the system to further the social goals set in the 1990 Fishery Management Act.

*Fishery workers' incomes* are calculated as a share of the landed catch less costs, often including quota leasing. Only vessel owners should pay the lease of quotas but crew members are increasingly being required to pay part of the leasing cost. There have been complaints about this illegal practice, which prompted the Althing (Parliament) to establish a Pricing Authority for Catch Prices to address such concerns.

### *Regional development*

According to a 1994 resolution by the Althing, the *main objectives* of regional development policy are to: *strengthen urban settlement* to ensure optimal exploitation of natural resources on land and in the sea; *encourage population growth* in areas most amenable to a diverse, prosperous economy and the provision of services that satisfy the demands of modern society; and *reduce the population movement to the capital region* in order to ensure optimal use of the nation's installations. In the second four-year regional development plan (1998), one target is to *increase the population outside the Reykjavik area by 10% in ten years' time*. Measures to be taken or strengthened are: equalising living costs across Iceland, decentralising education, building roads for all year travel to serve local economic interests, enlarging service areas, installing modern communications and decentralising government power. Activities of public institutions are to be increased outside the capital area and reduced within it, and heavy industry is to be established outside the capital area.

So far, the *regional development policy has not been very successful* in stopping the trend of internal migration to the Reykjavik area. During 1989-99, only two regions, apart from the capital area, had modest population growth (3-4%). In the rest of the country population is declining (Chapter 5, Section 2.2).

Within the framework of the regional development policy, different *regional plans* prepared by the relevant ministries are seen as co-operative agreements between the central government and local communities. The effects of the measures proposed can be quite significant at both local and national level for all aspects of *sustainable development*. For instance, building an aluminium smelter in eastern Iceland, where the population fell 20% during 1989-99, will have economic effects (sector structure of the economy, spatial distribution pattern of industry), social effects (number and type of jobs created, population movement both within and outside the country) and environmental effects (CO<sub>2</sub> emissions, impact on nature in the

highlands). The co-ordination of the different regional plans is to be improved. Given the migration trend to the capital area, the national and local effects of large-scale projects and the complexity of both interministerial and local co-ordination, it is recommended that a *national long-term plan for sustainable development* be prepared, with a strong spatial component; such a plan should provide an integrative framework and include goals such as: building consensus within society concerning regional development; improving co-ordination among the ministries on all dimensions of sustainable development; and providing a basis for national discussions on regional planning with local authorities.

## **1.2 Environmental democracy: information and participation**

### *Information*

Concerning *objectives*, the first OECD environmental performance review of Iceland in 1993 flagged important gaps in environmental information; it recommended that “available information might be brought more systematically to the public’s attention” and that environmental *monitoring, indicators and information* be improved. The 1993 National Environmental Strategy accordingly stated that “regular monitoring and effective flows of information form the basis for environmentally sound decisions and actions of individuals, businesses and government alike”, and aimed at completing a comprehensive national monitoring system as soon as possible.

Concerning *government responses*, for some years the Ministry for the Environment has issued annual reports describing its activities, and a comprehensive system of environmental monitoring is being prepared. *Periodic state of the environment reports* are not available. The National Environmental Strategy and the 1997 National Sustainable Development Action Plan have not led to forward-looking documents with environmental targets and indicators. Statistics Iceland has a large *database* accessible to the public, including environmental data. A joint committee from the Ministry for the Environment, other ministries and Statistics Iceland is working on a set of *national indicators* of sustainable development; NGOs and other stakeholders have not yet been involved in this work. A programme to develop green accounting has begun. The Environmental Education Board has set up an interactive environmental information network, linking 200 environmental Web sites in Iceland.

In terms of *legal obligations*, the 1993 Public Access to Environmental Information Act requests the government to *give the public information* on the environment; the information provided includes the state of the environment and natural resources, the use of natural resources, geographic data, biological diversity, emissions, physical planning, land use and socio-economic data. Also, decision makers at national and local levels, research and development organisations, NGOs and private companies

collect and use some environmental information and have their own databases. Iceland signed the 1998 *Aarhus Convention* and is in the process of ratifying it. Accession to the convention should guarantee the right of access to information, participation in decision making and access to justice.

Overall, since 1993, *progress has been achieved* in providing the public with the right of access to environmental information. However, much remains to be done to develop environmental information in the field of monitoring and reporting.

### *Participation*

A number of *ad hoc participatory mechanisms* have proved useful. For instance, follow-up to the National Environmental Strategy was organised with the help of seven working groups whose 120 representatives came from the government, the Parliament, business, NGOs, labour organisations, local communities and women's organisations. An ad hoc advisory committee reviewed the National Sustainable Development Action Plan and suggested creating a permanent National Council on Sustainable Development. The Ministry for the Environment is seeking ways to foster co-operation among government, civil society and business.

Some *more formal participatory mechanisms* are in place. The Ministry for the Environment formed the *Environmental Education Board* in 1998 to enhance environmental education in schools and for the general public; the board includes representatives from government, NGOs and industry. The 1993 *Environmental Impact Assessment Act* and related regulations require public participation in reviews of projects with effects on the environment, natural resources and the community: hydropower and geothermal plants, power lines, gravel mines, tourist facilities, waste disposal installations, aluminium smelters, chemical plants, transport infrastructure and ports. To increase accountability, private enterprises are to provide information about the environmental effects of their operations. The ongoing preparation of the *Master Plan for Hydro and Geothermal Energy Resources* includes consultation of a range of stakeholders from civil society.

Overall, *participation of environmental NGOs* in decision making is not uniform. NGOs say their relationship with the Ministry for the Environment is positive. NGO participation in policy development concerning other ministries (e.g. Fisheries) is less developed.

### *Local Agenda 21*

According to the National Environmental Strategy, local communities are encouraged to adopt their own environmental policies and to develop and implement action plans based on the principles of sustainable development. In 1998, a Local

Agenda 21 (LA21) programme was launched in co-operation between the Ministry for the Environment and the National Association of Local Authorities.

*A handbook on environmental action plans in local communities* was produced. The ministry has provided assistance to local authorities, who draw up their plans in three steps: collecting and reporting information on the situation; defining goals for sustainable development; and writing the action plan (Chapter 5, Section 2.3).

In all, 31 of the country's 124 municipalities, covering 40% of the population, have participated in the LA21 project. Once Reykjavik has finished its LA21, about 70% of the population will be covered. Obstacles include the small population of many participating municipalities and limited financial resources. Assistance for the LA21 programme was to continue until the end of 2000, but since many municipalities will not be ready by then, a five year extension of the programme is being considered.

### **1.3 Environmental education and awareness**

#### *Education*

The *education system* aims to give everyone an equal opportunity to receive education and is funded primarily by the public sector. There are *four levels*: pre-school (up to age 6), primary and lower secondary (ages 6-16; compulsory), upper secondary (ages 16-20) and university (from age 20). Since 1996, local authorities have had responsibility for the pre-school, primary and lower secondary levels.

*Environmental elements have been incorporated into curriculum guidelines for public schools at all levels.* At the *pre-school level*, nature and environmental themes are included. For *primary and lower secondary* pupils, environment is part of the curriculum in two ways: as part of natural science courses and as part of a new course called "Life Skills", introduced in 1999, which deals with personal development, community, environment and nature. Schools are working on the new course in co-operation with parents and pupils. In 1994, special attention was given to the problems of ozone depletion and climate change with the publication of a booklet for pupils aged 14-16.

In *upper secondary schools*, environment was introduced in the curriculum in 1999 with a similar two-way approach, and a booklet about climate change for this level was published in 1997. Some schools now offer environmental studies as a separate course. At the *university level*, some departments have begun to offer courses on the environment. A master's degree programme in environmental studies has been launched.

### *Awareness*

Public environmental awareness was last measured in 1993, when 70% of the population ranked environmental concerns over economic ones; soil erosion, waste management and ozone depletion were the highest-ranked environmental topics. In a 1999 poll, Reykjavik residents identified *air pollution, traffic safety* and *waste management* among the *most important problems*. A 1996 pamphlet on environmental action, published by the government in co-operation with the Women's Organisation of Iceland, was targeted at the general public and consumers.

Overall, environmental awareness has grown in recent years. The public generally perceives sustainable development primarily as an environmental issue, rather than a critical issue for long-term economic and social development. *More regular surveys* of environmental awareness and public priorities should be conducted.

### *Consumption patterns*

As in other countries experiencing relatively rapid economic growth, increased incomes have led to *growth in consumption and changing consumption patterns*. The population increase in the Reykjavik area has been accompanied by urban sprawl (and related need for environmental services and infrastructure), increased waste generation, growth in urban transport and occasionally haze.

The number of passenger *cars* fell in the early 1990s but since has been rising rapidly. New car registrations went from about 6 000 in 1993 to 19 000 in 1999, and registrations of new buses, lorries and vans rose proportionately almost as much. Increases in the number of four-wheel-drive vehicles have been particularly noticeable. Patterns of *food consumption* are significant in Iceland, given the extent of land degradation owing to overgrazing. During the past decade there was a significant switch from beef and lamb to pork and poultry. Effluent from pig farms is an emerging environmental problem. *Energy efficiency* has received less attention in Iceland than in many other countries because of the ample renewable energy sources. Energy use per unit of GDP and per capita is the highest among OECD countries, more than double the OECD average. This reflects energy-intensive industrial production, but also energy use by the fishing industry and transport. Geothermal hot water supply serves Reykjavik and many nearby communities (about 58% of the population).

The effectiveness of environmental policies and measures is in many cases dependent on human behaviour. It is therefore important to *understand the determinants of household consumption as affected by values and information*. Public participation and social research can contribute to understanding of values and environmental awareness. Concerning information influencing consumption, Iceland participates in the *Nordic eco-labelling programme* and a special effort has been made to further

inform consumers and businesses about the programme. Drinking *water prices* are relatively low, and waste water and waste charges only partly cover costs (Chapter 6). *Energy prices* are also relatively low and diesel fuel is not subject to excise tax.

## 2. Focus on Selected Topics

### 2.1 Social context

The *population* of Iceland reached 275 000 in 1999. In recent years, the population has risen by about 1.1% per year. The *health* of Icelanders in general is very good. Life expectancy is 80.7 years for women and 76.9 years for men (Table 5.1). The age composition of the nation is evolving towards a declining proportion of young people and a growing population of older people.

Iceland is the least densely populated country in Europe, with 2.7 inhabitants per square kilometre. The *population distribution* over the territory is rather uneven. Habitation is generally restricted to areas below 200 metres in altitude, largely along the coast and in a few other lowland areas. About four-fifths of Iceland is essentially uninhabitable. The average density of the inhabitable part of the country is 12.4 persons per square kilometre.

Table 5.1 **Social indicators**, late 1990s

	Unit	Iceland	Highest OECD	Lowest OECD
Population	('000)	276	271 342 USA	276 Iceland
Population growth 1998-99	(%)	0.7	1.9 Mexico	-0.4 Hungary
Population with upper secondary education <sup>a</sup>	(%)	54.8	86.5 USA	17.7 Turkey
Life expectancy at birth:				
Female	(years)	81.5	84.0 Japan	71.3 Turkey
Male	(years)	77.0	77.2 Japan	66.6 Turkey
GDP <sup>b</sup> /capita	(1 000 USD/cap)	26.6	38.9 Luxembourg	6.1 Turkey
Unemployment	(%)	1.9	15.9 Spain	1.9 Iceland

a) Share of population between 25 and 64 years old.

b) At 1995 prices and Purchasing Power Parities.

Source: OECD.

The *labour force* is estimated at 150 000 people and labour demand at 140 000 person-years (according to the National Economic Institute). About 82% of the population between ages 16 and 74 belongs to the labour force. The overall participation rate increased considerably in the past decade, primarily because more women and young people (ages 16-24) entered the workforce. Employment in economic sectors based on natural resources is significant but decreasing, while the numbers of jobs in the service sector generally, and in hotels and restaurants in particular, are growing (Table 5.2). Employment in manufacturing declined in the early to mid-1990s before recovering to its 1989 level.

For a long time registered *unemployment* was about 1% or less, but in the 1980s and early 1990s it increased, reaching 5% in 1995 (6.3% among women, 4% among men). Unemployment among women is higher in rural areas than in urban areas. In 1999, there were clear signs of overheating in the economy, and the labour market has become very tight, with the unemployment rate moving below 2%.

The *standards of living* in Iceland are comparable to those of the wealthiest industrialised countries. The distribution of wealth is fairly equal and the levels of disposable income (after transfers) in the lower and upper deciles are only a factor of four apart.

Social services represent almost 50% of public consumption (health 19%, welfare 16% and education 14%). Iceland has a two-part social security system. First, the *public system*, almost totally financed through the *state budget*, covers everyone. Health care is guaranteed through general health insurance. In addition to old-age and supplementary pensions, which guarantee a national minimum income, various additional

Table 5.2 **Employment**, selected sectors

	1989	1992	1995	1998	1989/98 (%)
Fisheries and fish processing <sup>a</sup>	14 893	13 023	13 735	12 795	-14
Agriculture <sup>a</sup>	6 399	6 514	5 596	5 160	-19
Manufacturing (excluding fish processing) <sup>a</sup>	16 195	14 776	14 022	16 029	-1
Hotel and restaurants <sup>b</sup>	..	3 900 <sup>c</sup>	4 600	4 400	+13 <sup>d</sup>
Total services <sup>b</sup>	..	89 700 <sup>c</sup>	93 200	97 000	+8 <sup>d</sup>

a) Person-years.

b) Persons.

c) 1993.

d) 1993-98.

Source: OECD; Statistics Iceland.



benefits exist, such as invalidity pensions, education support, birth allowances and benefits for widows and orphans. The second part is a system of *pension funds*, participation in which is obligatory for all employees and is financed by employee and employer contributions.

## 2.2 Regional development

Over the 20th century, *urbanisation* grew from 20% to 92%. In 1999, some 61% of the population lived in Reykjavik and surrounding towns. The largest population centre outside the capital area is Akureyri in the north, with 15 000 inhabitants. The other towns have fewer than 5 000 inhabitants.

After a long period of *migration from rural areas* to the Reykjavik area, as a result of the expansion of fisheries in the 1970s this trend was reversed: the extension of fishing limits from 12 nautical miles to 50 and then 200 helped many coastal villages prosper. In the 1980s and 1990s, migration towards the capital region again occurred, with a net influx of 15 805 people between 1981 and 1995. This is probably due to fluctuations in the yearly allowable catches and the development of on-board fish processing, which enhanced productivity in the processing industry and increased production capacity. In recent years competition in the fishing and processing industries and restructuring of the fishery sector have directly affected settlement patterns.

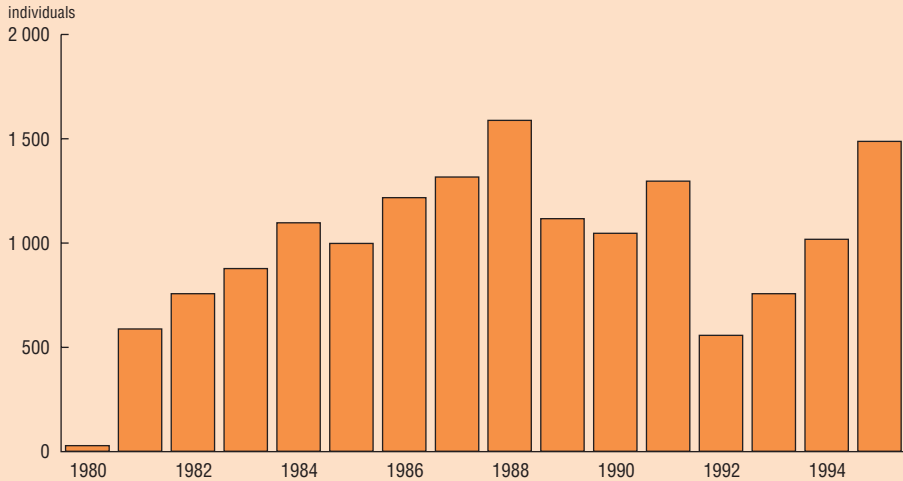
Over 1980-99 the *population of rural areas declined* and that of the Reykjavik area increased (Table 5.3 and Figure 5.1). Between 1989 and 1999, the population

Table 5.3 Trends in population distribution

	1980	1999	Variation (%)
Capital region	121 207	170 760	+41
Other regions	106 076	105 400	-1
<i>of which:</i>			
Rural areas	24 076	18 217	-24
Villages (50-999 inhabitants)	17 253	18 302	+6
Municipalities (1 000-4 999 inhabitants)	37 497	37 408	+1
Municipalities (5 000-16 000 inhabitants)	27 250	30 973	+14
Total	227 283	276 160	+22

Source: Statistics Iceland.

Figure 5.1 Net internal migration to the capital region, 1980-95



Source: Regional Development Institute.

increased in four regions (Reykjavik, two neighbouring regions and Akureyri) while in the other 21 regions it fell by between 0.5% and 21.4%. The highest rate of growth was in Reykjavik (19.2%) and this trend is likely to continue because of the capital's attraction for young people. Concern over emigration of young people abroad has remained, although emigration has decreased with the high rate of economic growth in recent years.

### 2.3 Local Agenda 21

Mosfellsbaer, a municipality about ten kilometres north of Reykjavik, is a community of about 6 000 inhabitants that is growing rapidly. It is drawing up a Local Agenda 21 plan using a manual produced by the Ministry for the Environment.

The following *steps* characterise the process:

- The municipality created a *committee to develop an LA21 plan*, with representatives of the three political parties, six representatives of the population (entrepreneur, forester, farmer, etc.) and the mayor. The committee chose

- three topics (energy and pollution, environment and nature, and culture) and organised a conference for the whole community.
- Participants at the conference discussed the topics and formed *three working groups*, each with 10-15 inhabitants. The groups met four times over seven months and drew up a list of possible targets and activities.
  - On the basis of this information, municipal civil servants wrote a *first draft of an LA21 plan*, finishing it in May 2000. The draft was given to the three groups for discussion and amendments. An amended draft was written, published on the Internet and in a brochure sent to all inhabitants of the community, and brought for discussion to the municipal council.
  - In the autumn of 2000, all remarks, suggestions, amendments and proposals were to be presented at a second conference for the whole community. Choices will be made about what to add to or delete from the plan. Actors responsible for each of ten activities are to be named and measures for *monitoring implementation of the plan* are to be prepared.
  - By the end of 2000, a *final draft is to be presented to the municipal council* for a final decision before implementation.

The activities in the first draft are: cultural heritage, population growth and land use, energy, environment and nature, physical planning and public space, consumption and lifestyle, education and culture, economy, leisure and health.

# 6

## SECTORAL INTEGRATION: FISHERIES\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- continue the more stringent approach to TAC setting adopted with the introduction of the *cod catch rule* in 1995, as well as associated technical regulations (e.g. closure of fishing grounds, net size regulations);
- adopt and implement catch rules similar to the cod catch rule for *other species* as appropriate, taking into account their biology and their value for the future of Icelandic fisheries;
- undertake further analysis of the economic, social and environmental implications of the *ITQ system* in the light of the latest evidence and experience;
- fully incorporate *small vessels* into the ITQ system;
- integrate *environmental concerns* in fishery policies and practices, including improved management of marine ecosystems, control of CO<sub>2</sub> emissions from the fishing fleet and reduction of effluents from fish processing;
- further develop and implement the *strategy for sustainable fishery management*, ensuring the coherence of environmental, social and economic objectives.

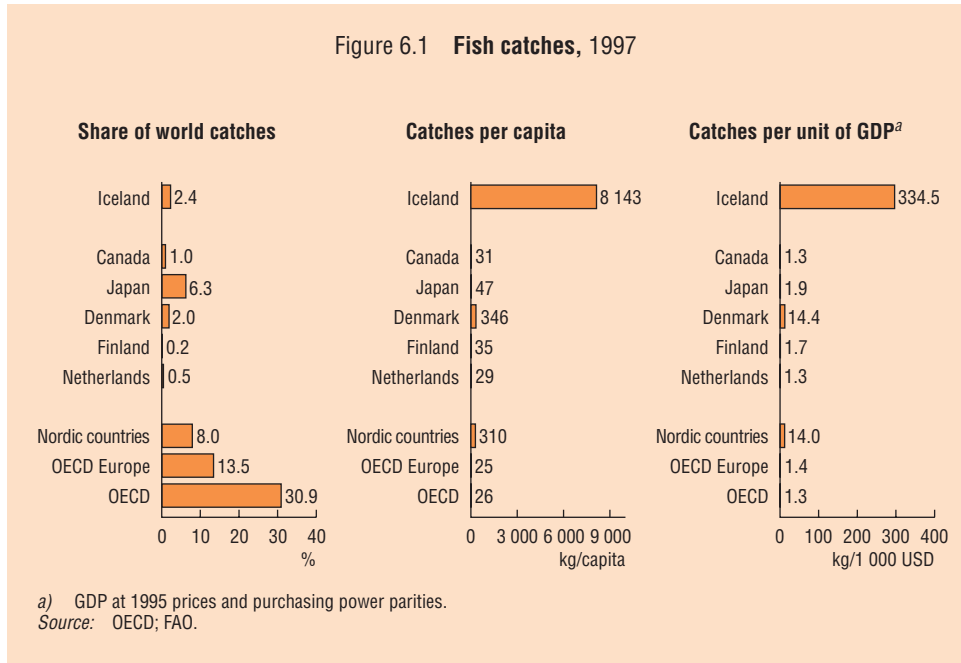
### 1. Evaluation of Performance

The *fishery sector*, comprising fishing operations and the fish processing industry, has long been Iceland's main economic base. In recent years the sector has

---

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993. This chapter also takes into account the latest OECD reviews of Fisheries.

Figure 6.1 Fish catches, 1997



accounted directly for about 14% of GDP, 10% of employment and 73% of the value of goods exports. It also has indirect economic effects, and in many coastal communities is the only primary activity. The total fish catch per capita (Figure 6.1), as well as per unit of GDP, far exceeds that of any other OECD country.

### 1.1 Setting objectives

The 1990 Fishery Management Act sets forth the overarching objective of Icelandic fisheries: to promote the *conservation and efficient utilisation of the exploitable marine stocks* of the Icelandic fishing banks, and thus to ensure stable employment and settlement throughout the country. These exploitable marine stocks are the common property of the Icelandic nation. The allocation of harvest rights that the Act provides for does not endow individual parties with the right of ownership or irrevocable jurisdiction over harvest rights.

The Ministry of Fisheries' priorities in implementing Icelandic fishery policy, as given in "Responsible Fisheries for the Future", are to:

- ensure and maintain *maximum long-term productivity* through responsible exploitation of all marine resources;

- ensure that all decisions are based on the most reliable *biological and economic information* and conclusions available at any time;
- ensure that individuals and enterprises in the *Icelandic fishery sector* have clear, generally applicable, non-discriminatory guidelines to follow, providing them with a positive working environment that will strengthen the sector's competitive position internationally.

The incorporation of *environmental objectives for the fishery sector* became explicit in 1998, the UN Year of the Oceans, when the Ministry of Fisheries issued a Declaration of Environmental Considerations: the ministry aims at “achieving sustainable utilisation of marine resources and basing management decisions on the best available scientific grounds. Every effort shall be made to preserve the biodiversity and ecosystem of the ocean”. Government decisions are to show regard for i) the obligation of each generation to pass on to its descendants a viable environment, ii) the duty of nations to protect marine life and the ecosystem, and iii) the importance of providing wholesome products for consumers of Icelandic seafood.

### 1.2 Setting catch rules

Following a period during which the *total allowable catch (TAC)* for the most important species exceeded that advised by scientists from the Marine Research Institute and the International Council for the Exploration of the Sea, since 1995 the Icelandic authorities have more carefully followed the scientifically based recommendations from the Marine Research Institute. The 1995 “cod catch rule” was a turning point in Icelandic fishery management. Iceland has built a *framework for its fishing sector* that can potentially provide the country with sustainable fish catches into the foreseeable future. Substantial improvements have been made towards the sustainable biological management of Icelandic fish stocks in the period under review, in particular since the cod catch rule was implemented (Chapter 6, Section 2.1).

Reports from the Advisory Committee on Fisheries Management (ACFM) of the International Council for the Exploration of the Sea (ICES) suggest that:

- the Icelandic *cod, redfish, herring* and *capelin* stocks are being fished within safe biological limits; a management rule is in place for capelin, but not for redfish or herring;
- the *saithe* and *greenland halibut* stocks are outside safe biological limits after years of poor recruitment and excessive catches; no management rules apply for these stocks;

- no formal management rule for the *haddock* stock exists, as highly fluctuating spawning stock and biomass complicate both assessment and advice.

The most important change in the 1990s was the *introduction of the cod catch rule*. It specifies that only 25% of the fishable stock (cod of age four and above) can be taken in any one year. Besides arresting the slide in the cod stock biomass and enabling the stock to be rebuilt, the rule has given stakeholders a clear sense of the “rules of the game”. As a side effect, pressures from stakeholders to increase the harvest have decreased.

The fishery management system could be further improved and extended by establishing *similar catch rules for other important commercial stocks* in the TAC system. This would require further research to establish the nature of the species, the state of knowledge about pressures on the stocks, and stock responses. Icelandic authorities are working on establishing further catch rules as a matter of priority.

The catch quota system is complemented by a *no discards rule, gear regulations* (e.g. net size, use of “excluders” to prevent unwanted catch) and *closure of fishing grounds*. The number of closures has been fairly stable since 1995, suggesting that the fishers themselves are making an effort to avoid unsustainable fishing. At the same time regulations are actively enforced, and in 1999 penalty fees totalled ISK 50 million.

These technical measures, combined with a solid *surveillance and enforcement system* and the built-in incentives of the *individual transferable quota (ITQ) system*, have given Iceland a regime with *very little non-compliance* (Chapter 6, Section 2.2), which is also partly attributable to the accessible, transparent guidelines and rules that form the framework for the fishery management system.

### 1.3 The three pillars of sustainable fisheries

Concerning *economic efficiency*, the fishing sector underwent some important developments in the 1990s following the introduction of the ITQ system. There has been a concentration towards larger vessels, some with at-sea processing capacity, and an associated increase in fleet efficiency (Chapter 6, Section 2.3). A *loophole is offered to small vessels*, however: they can opt for effort quotas (within a total combined quota for cod of 13.75% of the total cod catch each year), rather than fishing under the ITQ system. This resulted in a major increase in that segment of the fleet in the 1980s, although the number of effort-quota boats (under 6 tonnes) has decreased by 30% since 1992. The extent of the fishing power held by vessels devoted to

small-scale fishing and its impact on the effectiveness and efficiency of the ITQ system is a concern. This segment of the fleet needs to be fully incorporated into the overall ITQ system.

Concerning *environmental objectives*, there is a general shortage of information on the interdependence of species in the *marine ecosystems* around Iceland. A better appreciation of the links between marine mammals and fisheries is needed, along with more research into ecosystem management (Chapter 7). Pollution from the fishing industry is increasing. *CO<sub>2</sub> emissions from fishing vessels* increased by about 40% during the 1990s owing to fleet developments towards bigger vessels and at-sea processing. Very little has been done to address this issue, aside from the installation of electricity to power vessels in most harbours (Chapter 6, Section 2.4). In most fishing communities, *effluents from fish processing* flow directly into the sea, usually with no cleaning or treatment. Furthermore, fish processing commands substantial water use. Improvements are needed in these areas (Chapter 2).

Concerning *social objectives* (as defined in the 1990 Fishery Management Act), the *regional and socio-economic impacts* of the ITQ system, combined with other developments in fishery management, are complex. The increasing sophistication of quota trading, new markets (such as that for “flying fish” shipped fresh by air), increased at-sea processing and the growing use of non-Icelandic labour have weakened traditional links between fishers, processors and their communities. Some fishers, processors and communities have prospered more than others. Following a string of complaints and court cases on the fairness of the ITQ system, a Supreme Court decision in December 1998 prompted the setting up in 1999 of a special committee to evaluate the Icelandic fishery management system, including the distributional impact of quota allocations. The Althing (Parliament) has established a pricing authority to address concerns about payment for the lease of fishing quotas by vessel owners and crew. Increased transparency in the public debate on the fishery management system, including on quota leasing arrangements and their funding, is needed so that the concerns of various stakeholders can be addressed (Chapter 5).

Overall, the *integration of fishery policy with other policies* is limited. Some important environmental issues, such as CO<sub>2</sub> emissions from the fishing fleet and effluents from fish processing, have received little attention. There has been no coherent attempt to assess the social effects of the overall system, including the ITQ system; the relationship between fisheries and regional policy has not been defined and objectives remain unclear. While most information and data on fisheries are timely and readily available, it is not clear that *economic information* is being used to any great extent, including to review how well the economic objectives of stable employment and settlement, expressed in the Fishery Management Act, are being achieved. An integrated approach to economic, social and environmental aspects of sustainable



fishery development is clearly needed. Regular consultation needs to be further developed between the Ministry of Fisheries, the Ministry for the Environment and other relevant economic and social agencies. Consultation with other stakeholders and the public should also be increased. Moreover, it is important to research and evaluate the longer-term economic, social and environmental consequences of the fishery management system.

#### **1.4. International issues**

Iceland actively participates in a number of international activities dealing with fishery issues, including several bilateral fishery management arrangements and the recently established North East Atlantic Fisheries Commission. Iceland has worked with other nations to seek further *liberalisation of trade in fish and fish products* and the *elimination of fishery subsidies*. Further negotiations on this and related issues will take place in various forums in coming years, in particular with a view to ascertain which fishing subsidies have a bearing on fishing capacity building. Some criteria for the allocation of fishing quotas (and thus for related direct investments in the Icelandic fishery sector) may be challenged.

Iceland is also actively promoting legally binding international instruments and a global plan of action that will seek to limit the introduction of *persistent organic pollutants into the marine environment* (Chapter 7). These efforts need to be strengthened.

Concerning *whaling*, Iceland seeks to use the natural resources of the oceans within a sustainable development framework (Chapter 7). In decisions on whaling, the ramifications for other sectors of the economy, particularly the tourism and fishery export industries, need to be fully taken into consideration.

## **2. Focus on Selected Topics**

### **2.1 TAC setting**

The Ministry of Fisheries sets the annual TAC for each species covered by the management system. It *bases TACs on scientific input* from the Marine Research Institute, which assesses fish stocks within Iceland's 200 mile exclusive economic zone (EEZ). *Stock assessments* are also carried out within the context of ICES through the ACFM (Table 6.1).

The process of advising on TAC setting involves a number of steps by the Marine Research Institute, including data collection, data analysis, stock assessments through virtual population analysis or similar analytical assessments, stock

predictions and TAC recommendations. The institute incorporates in its models and recommendations the “precautionary approach”, as developed within the framework of ICES and the Food and Agriculture Organization.

*Sixteen commercially important species* are subject to TACs (and to quotas per individual vessel): cod, haddock, saithe, redfish, Greenland halibut, catfish, plaice, witch, dab, sole, long rough dab, herring, capelin, shrimp, lobster and scallops. Other species can be freely fished in the EEZ, although they account for only 2% of total catches.

*Biological knowledge* about the species of major commercial interest for the Icelandic fleet, particularly cod, is state of the art. Surveys are carried out regularly, complemented with investigations by the Fishery Directorate within the Ministry of Fisheries. However, more could be done on species of lesser commercial value and those potentially exploitable, including *long lived deep sea species* on which little scientific information exists. These types of fish, both within and outside Icelandic

Table 6.1 **Selected Icelandic TACs and catches, 1990-2000<sup>a</sup>**  
(‘000 tonnes)

	COD			HADDOCK			SAITHE			HERRING		
	Advice <sup>b</sup>	TAC <sup>c</sup>	Catch <sup>d</sup>	Advice <sup>b</sup>	TAC <sup>c</sup>	Catch <sup>d</sup>	Advice <sup>b</sup>	TAC <sup>c</sup>	Catch <sup>d</sup>	Advice <sup>b</sup>	TAC <sup>c</sup>	Catch <sup>d</sup>
1990	250	300	335	60	65	67	80	90	98	90	100	105
1991	240	245	309	38	48	41	87	65	103	79	110	110
1992	250	265	268	50	50	46	70	75	80	6	110	109
1993	154	205	252	60	65	46	75	95	72	110	110	103
1994	150	165	179	65	65	57	84	85	64	83	130	134
1995	130	155	169	65	65	61	72	75	49	120	110	126
1996	162	155	182	55	60	54	65	70	40	97	110	96
1997	186	186	203	40	45	51	52	50	37	90	110	65
1998	218	218	243	40	45	41	30	30	31	90	90	87
1999	250	250		35	35		28	30		100		
2000	247			35			25					

a) Fishing year is 1 September to 31 August.

b) Predicted catch corresponding to ACFM advice or national advice.

c) Nationally agreed TAC.

d) Catch according to ACFM calculations.

Source: ICES/ACFM.

fishing grounds, may be important to an overall assessment of the ecosystem within which Iceland's fishing fleet operates.

## 2.2 Technical regulations, enforcement and surveillance

TACs are supported by technical regulations: a *no discards* rule; *gear regulations* (in particular for net size and the use of "excluders"); and possible *closure of fishing grounds*. The technical regulations are administered by the Fishery Directorate and the Marine Research Institute; the latter has executive power for area closures. The Icelandic *enforcement and surveillance* system is strong and well equipped to carry out the necessary task of ensuring that the rules are followed. Surveillance takes place both on land and at sea.

*On land*, there are 14 inspectors, 11 of them doing on-site monitoring, which includes: monitoring of landings; weighing and registration of landings (for quota management purposes); monitoring of catch logs, fishing gear and catch composition; and, in that regard, size measurements. Basing their decisions on these observations, inspectors may suggest closing fishing grounds if fish in the catch are undersized or (although rare in practice) if there is too much by-catch. In addition, inspectors carry out technical work for biological research, and ensure that technical regulations related to fish processing and transport are followed.

*At sea*, surveillance comprises similar tasks but includes, most notably, surveillance of foreign fleets that have fishing rights within Iceland's EEZ. In 1999, Icelandic inspectors made 236 trips in all, totalling 3 206 days at sea.

The most important outcome of the on-land and at-sea surveillance and enforcement relates to fishing ground closures and charges brought against offenders. *Fishing ground closures* are essential to the quota management system. There were 80 closures in 1999 (compared with an average of 95 per year over the decade). Since 1995, the number of closures has been fairly constant at 70 to 80 per year, suggesting that fishers are making an effort to protect undersized fish. The Fishery Directorate also carries out *legal work* in connection with fishers who have fished illegally. In 1999, 115 cases were examined, 17 resulted in *charges* and one was brought to *court*. Fines amounted to ISK 50 million.

## 2.3 Concentration of the fleet and fleet efficiency

Developments in the Icelandic fishing fleet since the introduction of the ITQ system suggest that quotas are being concentrated among fewer vessels, and that the number of smaller vessels in the ITQ fleet has decreased (Table 6.2). The largest

decline has been for decked vessels of up to 12 gross registered tonnes (GRT), whose numbers decreased from 445 in 1990 to 328 in 1998, down 26%.

It was hoped that total fishing capacity would decrease with the introduction of the ITQ system. This has not been the case in terms of the total tonnage of the fleet; though the total numbers of vessels and fishers within the ITQ system have decreased, capacity (measured in both GRT and horsepower) has been fairly constant. This fact reflects a *change in fleet composition towards larger, more powerful vessels* (Table 6.2), and an increase in fleet efficiency. Tradable quotas have been the driving force behind *increased efficiency and productivity*, as the most efficient quota holders have been able to buy more quotas. Over 1980-90, labour productivity increased annually by 0.7% on average; for 1991-95, the annual increase was 1.5%.

The number of small open vessels (undecked, less than ten GRT, fishing with handline, longline or gill nets) was about 850 in 1998. Their number has increased considerably since the *management system offered a loophole*: their exclusion from the general ITQ system. In the 1998/99 fishing season, 1 096 small vessels were operating with permits; of these, 283 were within the ITQ system. The rest opted for fishing effort control (the number of days a vessel can fish), with or without a quota for cod. Small-scale operators working outside the ITQ system (effort-quota boats) took 15% of the cod catch in 1998/99.

The high degree of forward integration between fishing and processing makes it difficult to disentangle the effects of the ITQ system on processing. Nevertheless *consolidation in the industry* has taken place and there is evidence that profitability

Table 6.2 **Evolution in Iceland's fishing fleet**, selected years 1980-98

	Vessels (No.)	GRT <sup>a</sup> (tonnes)	Horsepower (kW)	Average age (years)
1980	863	105 228	336 118	17
1985	825	110 599	362 156	18
1990	996	119 801	420 803	16
1995	824	121 103	410 629	18
1998	795	120 743	414 020	20

a) Gross registered tonnes.

Source: Statistics Iceland; Fishery statistics of the Hagstofa Islands.

has increased. The rise of traffic at the international airport of Keflavik has been paralleled by *increased exports of fresh fish* (“flying fish”) to the United States and Europe.

## 2.4 Pollution

*CO<sub>2</sub> emissions* from fishing increased considerably in the 1990s (Table 6.3). The rise coincided with the introduction of the ITQ system and the subsequent developments in the fleet towards bigger vessels and on-board processing. Emissions related to fishing were stable through the mid-1990s at 750 000 tonnes, but rose significantly in 1996-98. Aside from a shift to electricity to provide vessels with power in most harbours, little has been done to reduce CO<sub>2</sub> emissions in fishing (Chapter 7). Renewal of the fishing fleet is encouraged by a Development Fund, part of which is used to finance buy-back programmes to retire old vessels. The fund is financed by a levy on ITQ lessees and vessel owners. In 1998 the ITQ lessees paid some ISK 600 million to the fund and vessel owners paid some ISK 80 million. Vessel owners pay according to vessel size.

In most fishing communities, *effluents from fish processing* (waste water and offal, unless used for fish meal processing) flow directly into the sea. Only in rare cases are the effluents cleaned and treated first. Estimates suggest that fish waste effluents amount to 3-5% of the raw material processed. Furthermore, fish processing in Iceland entails substantial water use; Icelandic authorities estimate that 14-36 tonnes of water is used per tonne of processed raw material. That is more than double the amount used for fish processing in other Nordic countries, where strict water use and effluent policies are in place.

Table 6.3 **CO<sub>2</sub> emissions from fishing**  
(‘000 tonnes)

	1990	1994	1998
Emissions from fishing	656	759	903
Total emissions	2 147	2 265	2 494
Proportion from fishing (%)	30.5	33.5	36.2

Source: EFA.

Part III

**INTERNATIONAL COMMITMENTS**

# 7

## INTERNATIONAL CO-OPERATION\*

### *Recommendations*

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Iceland:

- develop and implement a meaningful programme of measures, in consultation with all stakeholders, to *reduce GHG emissions from transport and fisheries*, while seeking international support for the greater use of industrial processes based on clean and renewable energy sources;
- develop knowledge and promote understanding for a policy of *sustainable utilisation of all marine resources* without compromising the future of any marine species;
- implement the newly transposed EU directives and *collect necessary environmental data* to meet international commitments;
- develop policy to protect *Ramsar sites* and natural parks of outstanding interest, with a view to maintaining the integrity of the Icelandic wilderness;
- *combat* soil erosion and land degradation and *create carbon sinks* through revegetalisation;
- increase *official development assistance*, to reach the OECD-DAC average;
- complete the *national report on biodiversity*.

### 1. Evaluation of Performance

Iceland's economy is *critically dependent on foreign markets* for its exports of fish products (about 73% of exports of goods) and of aluminium and ferrosilicon, and

---

\* The present chapter reviews progress in the 1990s, and particularly since the previous OECD environmental performance review of 1993.

for international tourism. For the sake of sustainable development, Iceland needs to maintain its very “clean” image, which supports its trade. Thus it is vital for new industrial development to avoid being associated with negative environmental images such as excessive greenhouse gas (GHG) emissions, destruction of wetlands of international significance, disturbance of significant amenity values or disappearance of endangered species. While the country should be able to use its natural resources fully to its own benefit, it is somewhat constrained by internal and external pressures that aim to protect environmental values of great significance, and these pressures are not necessarily based on scientific data.

The Icelandic Government’s sustainable development policy has to take into account the greater *globalisation* of the economy and the need to protect the common heritage of humankind. At the same time, Iceland is pressing for recognition by the international community of the global environmental benefit of providing access to abundant clean energy for industry. The country is likely to reassess whether its position on remaining outside international forums (e.g. the International Whaling Commission [IWC], the European Union) makes its policy goals more easy or less easy to achieve.

Assessment of Iceland’s performance in the area of international co-operation should take into account the fact that a *country with a very small population has to implement the same number of international agreements*, co-operation programmes and EU legislative acts as one with a much greater population. Additional hindrances are the need to translate every legal proposal or document into Icelandic and the country’s remote location *vis-à-vis* its trading partners. As will be noted below, Iceland’s performance in adopting and transposing many old and new *international environmental agreements* and over 200 *EU directives*, as well as in reformulating and modernising its own national environmental legislation, has been outstanding. Priorities have to be set, so much less attention was paid to OECD Decisions and Recommendations. Attendance at international meetings had to be restricted, yet Iceland was very active whenever important issues for its economic development were at stake.

The 1993 National Environmental Strategy states under “International Co-operation” that “efforts will be made to improve the reporting of environmental information and data and on increasing research activities necessary to meet internationally agreed objectives”. Improvements have taken place since 1993, notably with publication of research results and the creation of a Web site for the Ministry for the Environment. However, the *reporting of environmental performance to the international community* could still be much improved. For instance, there has been no report in English on the state of the environment since the 1992 Rio conference, and environmental statistics are very limited. Iceland’s contributions to international meetings and conferences are seldom easily available. Major government policy documents are not translated, either in full or abridged. This is rather unfor-



fortunate, because Iceland's position on sustainable development and optimal use of its national resources are matters of great interest in the international dialogue of which the country wants to be a part.

### *1.1 Regional issues*

#### *Co-operation within the European Economic Area*

Implementation of the 1992 Porto Agreement on the European Economic Area means that Iceland has had to *transpose into its own legislation over 200 legal acts* of the European Union on food safety, pollution control, chemicals and environmental management (but not on nature conservation or fisheries). The work is carried out by a special unit of the Environment and Food Agency (EFA) comprising 19 people, with translation support. Regular reports are sent to the European Free Trade Association Surveillance Authority, which checks to see that transposition is correctly carried out in Iceland, Norway and Liechtenstein. This body's overall assessment of Iceland's performance is quite positive. The EFA also has to ensure that environmental inspectors and municipalities are implementing the resulting legislation at their level. *Deficiencies in environmental data collection* have been found (e.g. for air and ambient water quality).

While Iceland has made great progress in transposing EU environmental laws, further effort is required *to improve data collection and publication*. New directives will need to be implemented in such areas as water, waste and strategic environmental impact assessment (EIA). In addition, the requirements of the urban waste water directive will have to be fulfilled and adequate treatment facilities built for the Reykjavik area. If primary treatment proves inadequate, further investment will be needed. Other financial requirements may arise as a result of directives on waste disposal, recycling, ozone, etc.

#### *Co-operation with Arctic countries*

Iceland gives considerable attention to the *Arctic Initiative* (Rovaniemi) for the protection and conservation of the Arctic environment. It has been a member of the Arctic Council since 1995 and hosts the secretariats of the working groups on the Conservation of Arctic Fauna and Flora and on the Protection of the Arctic Marine Environment in the framework of the Arctic Environment Protection Strategy. The increased efforts on nature conservation at national level should facilitate greater international co-operation on Arctic issues.

#### *Co-operation with Nordic countries*

Iceland is taking an increasing part in *co-operating with other Nordic countries* to develop environmental protection strategies. It contributed to the preparation of the

new Nordic Strategy for Sustainable Development and will host the Nordic Council meeting in November 2000.

### *Co-operation within the OECD*

Iceland has translated the *OECD Recommendation on greening of government operations* into a policy paper, "Environment Policy in Government Operations", but does not seem to be taking action concerning most OECD Decisions and Recommendations unless they are included in transposed EU legislation. This situation could be improved, especially when Iceland draws up policies, strategies or action plans.

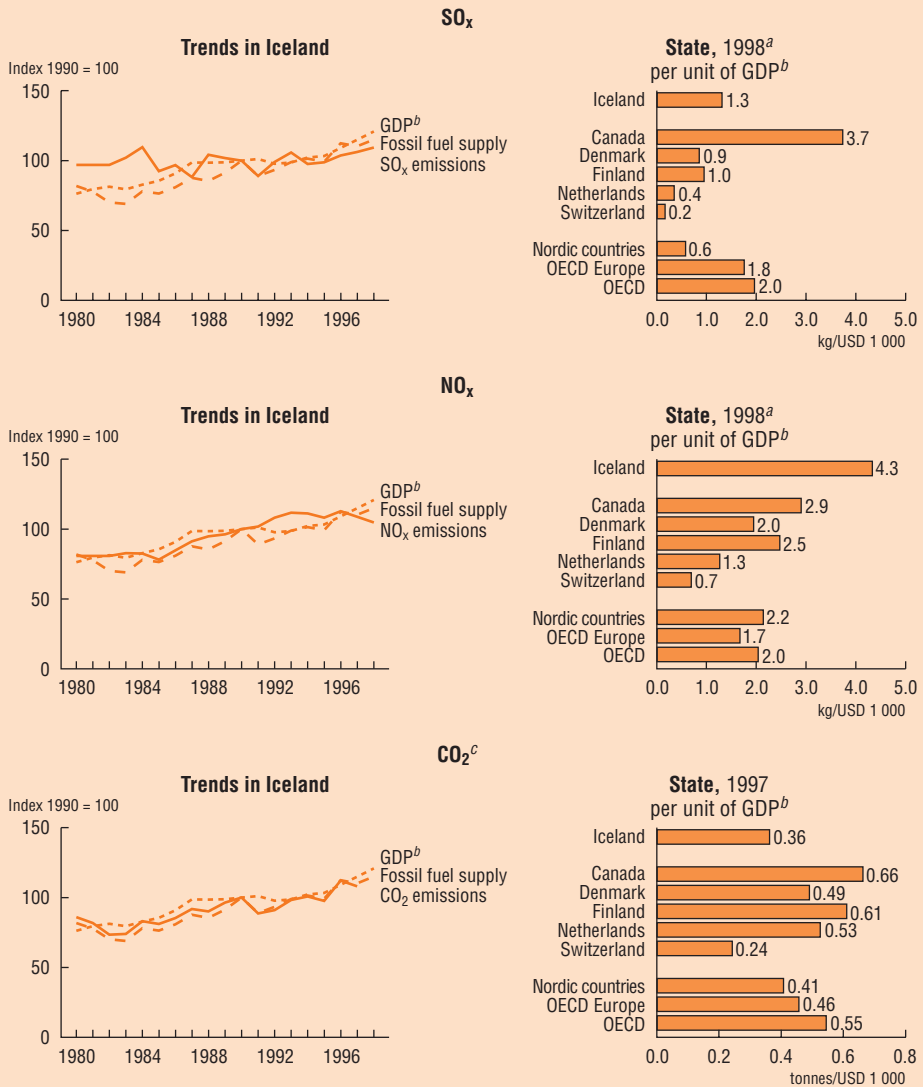
### *Air pollution in the Nordic and UN/ECE context*

Iceland is exposed to *transboundary air pollution* originating in Europe, and contributes very little to air pollution in Europe. Air pollution and deposition rates in Iceland are minuscule. Iceland is a party to the 1979 Convention on Long-Range Transboundary Air Pollution. It considered becoming a party to the protocols on NO<sub>x</sub> (1988) and VOCs (1991), but ultimately decided not to be bound by these agreements. Nevertheless, in the Nordic Action Plan, Iceland undertook to reduce its NO<sub>x</sub> emissions by 30% and its VOC emissions by 50% between 1998 and 2005.

*Iceland's NO<sub>x</sub> emissions per capita or per unit of GDP are considerably higher* than the OECD average. This is largely due to the extent of emissions from the fishing sector, which account for 67% of the total and grew by 22% during the 1990s. NO<sub>x</sub> emissions increased in the 1990s while VOC emissions fell by about 30%. *The increase in NO<sub>x</sub> emissions is not in line with Iceland's undertaking in the Nordic Action Plan* (a 30% reduction over 1988-2005) or its own government's 1993 target of stabilising local air pollution at 1990 levels. The decline in Reykjavik's air quality because of traffic-related emissions is another sign of a worsening pollution situation (Figure 7.1).

While growth in NO<sub>x</sub> emissions is a source of concern in many countries, Iceland is among the countries hoping that a technical solution will be found and that it will not have to take difficult preventive measures. The recent decrease in the car registration tax for larger vehicles provides an economic signal that contradicts attempts to reduce car NO<sub>x</sub> emissions. *Stronger air pollution abatement measures are needed* in the inhabited areas near Reykjavik and aboard fishing vessels, which are by far Iceland's largest emitter of NO<sub>x</sub> (as well as a major source of CO<sub>2</sub>).

Figure 7.1 Air pollutant emissions



a) Or latest available year.

b) GDP at 1995 prices and purchasing power parities.

c) Emissions from energy use only; excludes international marine bunkers.

Source: IEA-OECD.

## 1.2 Marine issues

Iceland attaches great importance to sustainable management of marine resources and to combating marine pollution.

### *Marine resources*

Iceland's policy is that all living resources of the sea within its exclusive economic zone (EEZ) should be utilised sustainably (Chapter 6). This means principally fish, but also marine mammals such as whales and seals, which are also part of the marine ecosystem (Chapter 7, Section 2.1). Iceland aims to extract the *maximum sustainable yield of protein* from the total marine ecosystem without endangering any species. Because species interact with each other, there may be a need for action concerning all species to achieve sustainable development.

### *Marine pollution*

In 1995, inspections and monitoring for ocean pollution were moved from the Shipping Agency to the EFA. Iceland *actively participates in the OSPAR Commission* and implements most of the pertinent decisions and recommendations. It supports the OSPAR commitment to eliminate chemical pollution of the seas by 2020. It also supports the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (1995).

Iceland attaches great importance to long-distance pollution by *persistent organic pollutants (POPs)* and by *heavy metals*, in part because such substances accumulate in fish. A survey of these pollutants in Icelandic waters has shown that the exposure levels are very small and that Iceland's emissions of PCBs and DDT have been falling, though there is a higher background level of cadmium of volcanic origin. Iceland has created a national system to eliminate hazardous waste, financing it by a levy on the sale of certain products, such as batteries and solvents. Iceland also supports the Nordic Action Plan's target of halving POP releases over 1985-95. As the concentration of POPs in Iceland is very low, it is unclear from the data whether the target was reached. In 1993, the use of tributyltin in shipping was prohibited and its use on land ceased in 1994.

Iceland is a party to the UN/ECE 1998 conventions on POPs and heavy metals, and it supports the adoption in 2001 of a global convention on POPs, which would ban at least 12 substances.

### *Maritime traffic*

Iceland has become a party to the *Paris Memorandum of Understanding on Port State Control*. Related ship inspection is carried out by the Icelandic Maritime

Authority (under the Ministry of Communications), which had to increase the rate of inspection during the 1990s. Iceland annually imports 650 000 tonnes of oil and gasoline by tanker, carrying 15 000 to 30 000 tonnes per trip; ships carrying about 2 000 tonnes then redistribute this fuel. As a party to the *Copenhagen Agreement* on co-operation in the prevention of marine pollution from oil and other dangerous chemicals, Iceland could obtain assistance from other Nordic countries if needed. It has also become a party to the 1990 Convention on Oil Pollution Preparedness, Response and Co-operation. Its *oil preparedness plans were strengthened* in 1993-94. Five regional action centres and a critical equipment depot were created. Available equipment includes four high pressure pumps, five skimmers, two spray booms and 1 700 metres of booms, which is considered adequate to deal with a 500 tonne spill. The operational structure is under the control of the EFA, with assistance from municipalities and the Icelandic Coast Guard. Exercises are carried out yearly. A risk assessment is being prepared, which may specify tanker routes.

### 1.3 Global issues: climate change

Iceland is a party to the UN Framework Convention on Climate Change (UNFCCC) (Chapter 7, Section 2.2), and considers climate change a very significant issue. It has striven to *limit its emissions of CO<sub>2</sub>* and other GHGs in 2000 at their 1990 level *despite new energy-intensive development (using clean energy sources)*. It would seem that the stabilisation commitment has been met, if account is taken of carbon sequestration in soil. On the basis of gross emissions, CO<sub>2</sub> emissions increased in 1990-2000 by 26.3% and GHG emissions rose by 15.2%. GHG emissions could increase by 25% over 2008-12 if plans for new aluminium plants are carried out, and by 50% if other proposed investments are made.

Iceland is seeking recognition of its “*special circumstances*” regarding new energy-intensive plants and hopes to factor in its carbon sequestration programme. While such an approach is reasonable from a sustainable development point of view, it remains to be seen whether the parties to the UNFCCC will agree to it. Iceland thus has decided to wait for this matter to be resolved before committing itself to sign or ratify the Kyoto Protocol.

The country faces a difficult problem in that most of the reductions in carbon emissions that can be made in other countries were made in Iceland before 1990 or are not feasible there. At this stage it is hard to know whether Iceland has taken adequate steps to reduce its GHG emissions. Few measures so far have been implemented, and the decisions to introduce them were taken only recently. Furthermore, the expected effects of such measures have not been documented and little cost-benefit analysis of alternative measures has been made.

Iceland could probably reduce its use of fossil fuels, but this might require new incentives such as a carbon tax or subsidies. In particular, it would be *useful to investigate whether emissions from the transport and fishery sectors could be reduced* by the introduction of pollution control measures that have proved effective elsewhere. Such measures could be financed by all polluting sectors together or by each sector for itself. At a time of rapid economic growth, the transport and fishery sectors could make further efforts concerning GHGs.

### *1.4 Other global issues*

#### *Ozone-depleting substances*

Iceland has implemented the Montreal Protocol and its amendments, banning imports of *halons and CFCs* as of January 1994 and January 1995, respectively. Use of HCFCs is to cease by 2015. The fishing industry is seeking to move directly from CFCs to ammonia for refrigeration. By 2010, use of CFCs is to cease. The private sector carries out recycling of CFCs and halons under EFA control. Iceland has contributed to the Montreal Trust Fund.

#### *International issues regarding nature conservation*

During the 1990s, Iceland ratified many agreements concerning nature protection and adopted laws to promote better protection of its natural assets, many of which are of great international significance (Chapter 7, Section 2.3). The staff devoted to nature conservation has been increased. New national protected areas and Ramsar sites have been designated. Funds have been spent for *reforestation* of degraded areas and revegetation of others, resulting in sequestration of 100 000 tonnes of CO<sub>2</sub>. While overall progress is significant, the Ramsar wetland of Myvatn could still be damaged by an extension of a diatomite extraction plant. Iceland has not yet completed its national report on biological diversity.

#### *Trade and the environment*

Iceland agrees with the idea that trade and environment policies should be mutually supportive, and that unilateral trade restrictions for environmental purposes should be avoided. It backs efforts to eliminate barriers in the trade of fishery products and has argued internationally for global removal of subsidies in the *fishery sector*, which would promote a more sustainable use of marine resources. However, within its EEZ, Iceland prohibits the leasing of fishing quotas to foreign-owned vessels.

Iceland has become a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. In 1994, 14% of its *hazardous waste* was exported for treatment in other OECD countries.

### *Aid*

Iceland's contribution to development aid is *low, in relative terms, compared with the 22 OECD-DAC countries*, amounting to only one-fourth of the government's own target (Chapter 7, Section 2.4). The aid goes to such areas as fishery management and geothermal energy development. Iceland does not contribute to the Global Environment Facility (GEF) but it supports Nordic Environmental Finance co-operation (NEFCO), which provides environmental aid to the economies in transition.

## **2. Focus on Selected Topics**

### ***2.1 Conservation and sustainable use of whales***

Icelandic waters contain *large numbers of whales* and other *marine mammals*, such as white beaked dolphins, harbour porpoises and seals. These animals represent a total mass many times larger than that of the cod stock. Marine mammals are so plentiful near Iceland that many *whale watching companies have been created* to take tourists for a day at sea, with a whale spotting success rate of over 95%. The economics of whale watching looks very promising.

Whales and other marine mammals *have not been hunted* in Icelandic waters since 1989, though seals continue to be caught. Average annual catch in the years prior to the ban totalled about 230 fin whales, 70 sei whales and 200 minke whales. Detailed studies of the *whale stock* in the Icelandic EEZ carried out in the 1990s showed stocks of 20 000 fin whales, 10 000 sei whales and 70 000 minke whales. These large numbers indicate that the three species are neither threatened nor endangered. *Whales and smaller cetaceans* near Iceland *consume 6 million tonnes* of fish and various other species, i.e. *much more than* the 1 to 2 million tonne *fish catch of the Icelandic fleet*. The whale stock has been increasing to such a degree as a result of the ban that it is likely to reduce the long-term yield of cod by some 15%. Implementing the ban has thus had a negative effect on the value of cod and other fish catches.

Sustainable utilisation of the most valuable marine resources within the EEZ would therefore imply a restriction on the whale population. Scientific evidence gathered during the 1990s does not indicate that the whale populations in the Icelandic

EEZ would be at risk from a small annual catch. *Resuming very limited whaling operations* under closely supervised conditions would be in line with the objective of sustainable development. Iceland's official position has always been that whales should be utilised sustainably, like any other marine resource.

Iceland is a member of the North Atlantic Marine Mammal Commission, together with Greenland, the Faroe Islands and Norway. It withdrew from the IWC in 1992, because that body did not agree to end the moratorium on whaling that had been in effect since 1986. Iceland is now the only traditional whaling country outside the IWC.

Citing the *Law of the Sea Convention*, which entered into force in 1994, Iceland holds that efforts by some states to try to impose a permanent ban on commercial whaling, regardless of the status of the stock in question, constitutes a violation of the sovereign rights of states that have not decided to be bound by such ban.

The Althing (Parliament) resolved in March 1999 that *whaling in Icelandic waters should resume as soon as possible* and instructed the government to publicise Iceland's viewpoint among its trading partners. This is significant because the scientific evidence does not support the very strict ban adopted so far for all species of whales in all places. Furthermore, there may be conflicting clauses in applicable conventions. At present, Iceland faces major opposition against lifting its whaling ban and resuming whale hunting in its waters.

## 2.2 Climate change

Iceland emits 0.01% of total world GHG emissions. Iceland's GHG emissions are 82% CO<sub>2</sub>, 9% methane, 4% nitrous oxide and 5% other gases (Table 7.1). *Its CO<sub>2</sub> emissions per capita came to 9.1 tonnes* in 1998, compared with an OECD average of 12 tonnes. These emissions arise from fishing vessels (26%), other transport (26%), industry (32%), geothermal energy production (3%) and other stationary sources (13%) (Table 7.2). More than two-thirds of the country's total primary energy supply and over 95% of the energy for stationary installations comes from clean, renewable sources (hydropower and geothermal energy). The share of emissions from fishing vessels and road vehicles is high because emissions from the residential sector (which is supplied by electricity and geothermal energy) are virtually non-existent.

During the 1990s, Iceland somewhat increased the energy intensity of its economy, which was already quite high (Figure 7.2). It expanded the production of an aluminium plant at Straumsvik from 100 000 tonnes a year to 160 000 (1997), built a new aluminium plant at Grundartangi with initial capacity of 60 000 tonnes per year (1998), enlarged a ferrosilicon plant (also at Grundartangi) from 70 000 tonnes per



Table 7.1 **GHG emissions in Iceland**  
(kt CO<sub>2</sub> equivalent)

	1990	1998	Change from 1990 (%)	2000 <sup>a</sup>	2005	2010
					(forecasts)	
CO <sub>2</sub>	2 147	2 482	15.6	2 712	2 811	2 908
CH <sub>4</sub>	294	287	-2.4	283	285	292
N <sub>2</sub> O	126	120	-4.8	142	149	153
HFC	-	64	-	48	73	120
FC	304	82	-73.0	124	124	124
SF <sub>6</sub>	5	5	-	5	5	5
Total GHG	2 876	3 040	5.7	3 314	3 446	3 603

a) Estimate.

Source: Ministry for the Environment.

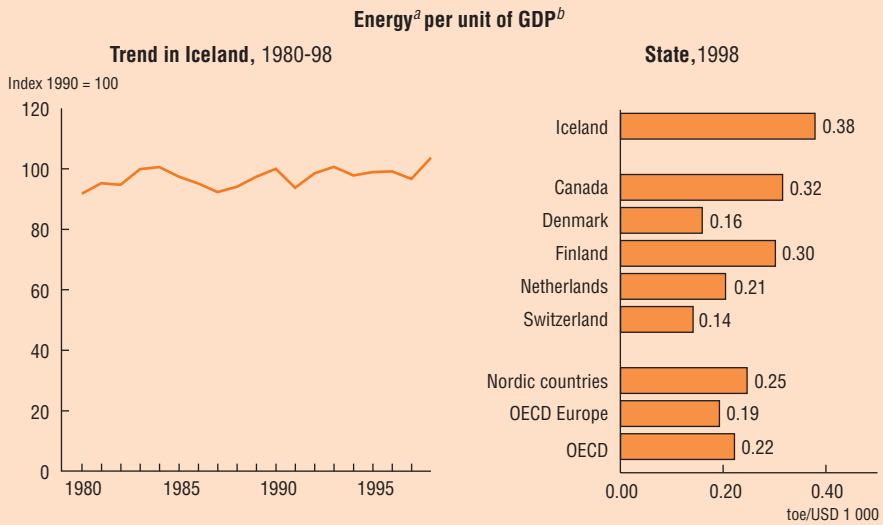
Table 7.2 **CO<sub>2</sub> and GHG emissions, by sector**  
(kt)

	1990	1995	2000	2005	2010	Growth 1990/2000 (%)	Growth 1990/2010 (%)
Total CO <sub>2</sub>	2 147	2 282	2 697	2 795	2 893	25.6	34.7
<i>of which:</i>							
Total fuel combustion	1 753	1 853	1 957	2 055	2 153	11.6	22.8
Total processes	391	425	736	736	736	88.2	88.2
Other	3	4	4	4	4	33.3	33.3
<i>of which:</i>							
Residential	43	37	26	21	21	-39.6	-51.1
Transport	721	749	819	870	923	13.6	28.0
Fisheries	656	772	796	856	903	21.3	37.6
Industrial fuel combustion	243	212	232	225	223	-4.5	-8.2
Industrial metal processing	341	389	702	702	702	106	106
Total GHG	2 730	2 640	3 161	..	3 445	15.8	26.2

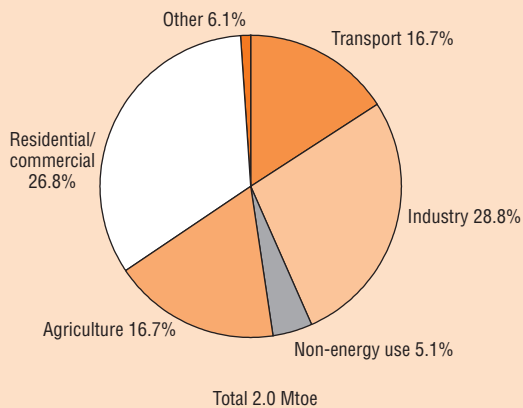
Source: Second Report of Iceland to UNFCCC.

year to 115 000 (1999) and approved the extension of the Grundartangi aluminium plant by 30 000 tonnes per year (2000). *These plants consume electricity and emit CO<sub>2</sub>* (e.g. 1.5 tonne of CO<sub>2</sub> per tonne of aluminium). Discussions have begun on a new 480 000 tonne aluminum smelter in eastern Iceland (at Reydarfjörur), but no

Figure 7.2 Energy structure and intensity



Total final energy consumption by sector, 1998



a) Total primary energy supply.

b) GDP at 1995 prices and purchasing power parities.

Source: IEA-OECD.

decision has been reached. An alternative would be to invest in developing countries that have no CO<sub>2</sub> or GHG target to be met or in larger developed economies where an additional plant would contribute only a small share of total GHG emissions. The total addition to GHG emissions from planned industrial development in Iceland is 1 760 kt, or 53% of current emissions.

Over 1990-98, *GHG emissions increased by 5.7% and CO<sub>2</sub> emissions increased by 15.6%*. The reason for the discrepancy is a 65% decrease in fluorocarbon emissions from an aluminium smelter. According to latest estimates, GHG and CO<sub>2</sub> emissions are likely to increase by 15.8% and 25.6%, respectively, over 1990-2000 and 26.2% and 34.7% over 1990-2010. The increase in GHG emissions between 1990 and 2000 is estimated at 437 kt. New energy-intensive industries added 442 kt but existing plants reduced their emissions by 160 kt. The transport and fishing sectors also increased their emissions. Emissions of methane slightly decreased and those of nitrous oxide increased by 16 kt.

As a party to the *UNFCCC*, Iceland stated in 1992 that its policy was to “stabilise and, if possible, to progressively reduce emissions of CO<sub>2</sub>”. In the 1993 National Environmental Strategy, the government said that it “aims at stabilising at 1990 levels greenhouse effects on account of domestic consumption before the turn of the century”. In the “Second Status Report for Iceland” (1997), it restated its objective “to limit emissions of CO<sub>2</sub> and other GHG at the end of the century to the levels of 1990”, but also said that “obligations to limit emissions of GHG should not prevent new energy intensive industrial development which would take advantage of the country’s clean energy sources”. Thus the expected doubling in CO<sub>2</sub> emissions from industrial processes over 1990-2000 is excluded in terms of Iceland’s target of keeping emissions at the same level in 2000 as they were in 1990. If all energy-intensive industries took full advantage of their licences, total GHG emissions would be about *46% higher in 2010 than in 1990*. With industrial processes excluded, *CO<sub>2</sub> emissions rose by 6% over 1990-95 and by 12% over 1990-2000*.

To reach its objective, in 1995 Iceland adopted a *National Climate Change Action Programme*, supervised by a special interministerial co-ordination committee with participation from seven ministries. The plan proposes measures to reduce emissions from fishing vessels, domestic transport, industry and waste disposal, and to enhance carbon sequestration in agricultural soil. *The measures implemented so far* are: i) greater use of electricity in harbours (to avoid running ships’ diesel engines to refrigerate cargoes); ii) replacement of oil by electricity in fish meal factories; and, iii) carbon sequestration in soil. In 2000, it was agreed to modify the car tax to promote use of cleaner cars (electric, LPG and hybrid cars). Discussions are under way on reducing emissions from traffic in the Reykjavik area. Implementation of the action programme has decreased fuel consumption in industry and the residential

sector, and further progress is expected. The carbon sequestration programme has been successful, likely reaching its target of 100 000 tonnes of additional yearly carbon sequestration by the end of 2000. Current indications are that Iceland may achieve its objective of stabilising of CO<sub>2</sub> emissions because the increase in the carbon sink will compensate for the growth in CO<sub>2</sub> emissions.

Further efforts to reduce *CO<sub>2</sub> emissions in transport and fishing* will be needed, but Iceland is dependent on technological progress from abroad. Fiscal measures against highly polluting cars and trucks could be introduced, strengthened by a ban on importing used cars. Fuel taxation should be revised to remove all indirect incentives for higher emissions. Greater attention should be given to the role of transport and road policies in the expansion of private vehicle use.

Iceland has *not signed the Kyoto Protocol*, under which it would have to limit its GHG emission growth in 2008-12 to 10% over the 1990 level. The reasons for its decision are, first, that it has not yet managed to negotiate a derogation on the grounds of an economy that depends very little on fossil fuel because it developed *clean energy* before 1990, making use of local hydropower and geothermal sources; and, second, a large potential for economic development by building large aluminium or ferrosilicon plants using its clean, renewable energy. It should be noted that much Icelandic production of aluminium, ferrosilicon and fish goes to foreign markets; these sectors are very large in comparison with the country's population.

Iceland would like to obtain full recognition of its "*special circumstances*" so as to be able to become a party in 2001 to the Kyoto Protocol without jeopardising its economic development. Discussion is continuing on the "Icelandic provision", a derogatory clause applying to countries in which a single project would increase GHG emissions by a large percentage during the commitment period. As Iceland has pointed out, a single factory with capacity of 180 000 tonnes of aluminium production increases the country's total emissions by 11% even though the electricity used is entirely from renewable resources. In 1998, Iceland proposed that small economies (those contributing less than 0.05% of the total emissions of Annex I countries in 1990) be able to exclude new projects causing an increase of over 5% of total emissions from the calculation of their emissions under the Kyoto Protocol, provided that the projects use best environmental practice and are beneficial overall (low CO<sub>2</sub> emissions, use of renewable energy). This derogatory clause could be used by four countries at most, of which Iceland is the only one with significant cheap renewable energy resources.

Iceland also wishes to be able to take into account *carbon sequestration in soil*, i.e. to broaden the Kyoto Protocol clause on afforestation to include revegetation and soil improvement.

Other policy alternatives include requiring investors to finance *reforestation programmes* in compensation for increased GHG emissions, or to buy *emission rights* elsewhere. This application of the polluter pays principle could have the effect of discouraging new investment in aluminium smelters in Iceland. Some experts estimate that implementing the Kyoto Protocol without the derogatory clause would reduce Iceland's GDP by one percentage point, which could be absorbed in a rapidly expanding economy.

### 2.3 Wildlife and nature protection

In 1996, Iceland added a *third Ramsar site*, Grunnafjörur, to the two sites selected previously (Myvatn, 1978, and Thjorsaever, 1986). It found a temporary solution to the conflict concerning diatomite exploitation in Lake Myvatn and intends to designate three additional new sites by 2005. Pursuant to the new responsibility it received in the Nature Conservation Act of 1999, the Nature Conservation Agency is examining which Icelandic wetlands would qualify for Ramsar designation on the basis of new Ramsar criteria. For this purpose, it is using new maps of wetlands and bird habitats produced by the Icelandic Institute of Natural History.

The issue of a possible further extension of *diatomite exploitation in Lake Myvatn* will have to be addressed shortly. An EIA and an expert review concerning this issue will be submitted to the government for decision. It is quite possible that a compromise solution will be found, allowing further extraction of diatomite (and keeping related jobs in the area) while avoiding significant environmental degradation.

Iceland has become a party to the *Convention on Biological Diversity*. It has not yet completed its national report under this convention but has taken numerous measures to improve protection of biodiversity. A revised red list has been issued for plants, and the list for birds was finalised in 2000.

Iceland is also a party to the *Desertification Convention*. About half of its territory is subject to serious soil erosion and land degradation, in part because of overgrazing. The loss of carbon in its soil and vegetation since settlement in the ninth century represents 1.6 billion tonnes of CO<sub>2</sub>, i.e. 533 times the current annual emissions (3 Mt/year.). Planting of degraded land leads to carbon sequestration (in this case, 100 000 tonnes per year over three years at a price of about ISK 1 000 per tonne). Financial support for this undertaking to restore degraded lands, which amounted to over ISK 100 million in 1990, should be continued. Reforestation should also proceed, at an estimated cost of ISK 400 million per year.

Iceland has become a party to the *Bern Convention* and the *Washington Convention* (CITES) and is considering joining the Bonn Convention. Reservations were made for whaling, traditional hunting, and species that are common in Iceland, such as the arctic fox. Iceland is also a party to the *Paris Convention on World Natural and Cultural Heritage*.

Because of such recent international commitments, *many significant changes* have had to be introduced in domestic legislation (Nature Conservation Act, Planning and Building Act, Protection and Hunting of Wild Species Act, Geodetic Surveys and Mapping Act, etc.). The historic right to cross private property and travel freely in the countryside has been increased. The 1999 Nature Conservation Act lists wetlands, volcanic formations, lakes and hot springs as types of landscapes that should enjoy special protection. The personnel in charge of nature protection has increased tenfold over its 1992 level. While protected areas represent 9.5% of the country, a much greater proportion of the territory could be protected. This would be in line with the 1993 government objective to “establish more national parks and protected areas”.

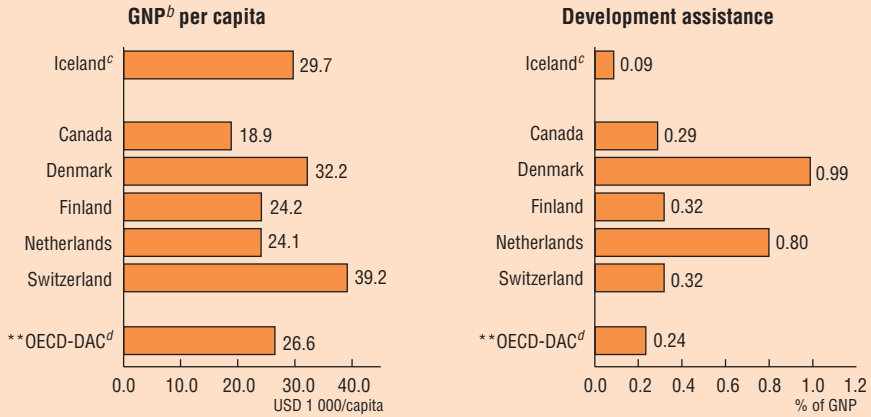
BIOICE, an extensive *research* programme on distribution and abundance of benthic invertebrates within the EEZ, provides a baseline study and has identified over 20 new species.

## 2.4 Development aid

Iceland ranks fourth among OECD countries in terms of GNP per capita, but its level of official development assistance (ODA) is very low, amounting to *0.1% of GNP over 1994-98* (Figure 7.3). The government’s goal in 1993 was to reach 0.4% of GNP by the turn of the century through annual 20% rises. A more distant goal is to increase the aid level to reach 0.7% of GNP in the future.

The *development aid budget* for 1998 consists of ISK 184 million to international financial organisations (International Monetary Fund, International Development Association, Nordic Development Fund [NDF], European Bank for Reconstruction and Development, NEFCO) and ISK 328 million of direct grants, mostly to the following recipients: Icelandic International Development Aid Agency (ICEIDA), ISK 177 million; UN University for a geothermal training programme, ISK 31 million; Bosnia, ISK 27.5 million; UN University fisheries training programme, ISK 21.5 million; and UNDP, ISK 18.3 million.

The aim of Icelandic ODA is to help people become self-sufficient and to promote sustainable development, *protection of the environment* and natural resources,

Figure 7.3 Official development assistance, 1998<sup>d</sup>

- a) Provisional data.  
 b) GNP in USD at current exchange rates.  
 c) National sources.  
 d) Member countries of the OECD Development Assistance Committee.  
 Source: Statistics Iceland; OECD-DAC.

increased productivity, equality of individuals, democracy and human rights. In particular, Iceland provides development assistance for selected sustainable fisheries; hydro and geothermal harnessing and transfer of knowledge; and education in natural disaster monitoring, preparedness and response.

ICEIDA provides bilateral aid to countries such as Namibia, Mozambique, Malawi and Cape Verde. In 1998, 47% of bilateral aid was for fisheries and 30% for education. Iceland participates in the NDF and supports NEFCO, which provides assistance to environmentally favourable projects in Central and Eastern Europe. Iceland contributes to the *Montreal Trust Fund* and the *Ramsar Wetland Fund*. It is considering whether to participate in the GEF, for ocean and biodiversity activities. In 1998, Iceland created a fishery training programme for professionals from developing countries.

# ANNEXES

I.A Selected environmental data

I.B Selected economic data

I.C Selected social data

II.A Selected multilateral agreements (worldwide)

II.B Selected multilateral agreements (regional)

III. Chronology of selected environmental events (1990-2000)

IV. The physical context



## ANNEX I.A: SELECTED ENVIRONMENTAL DATA (1)

	CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	
<b>LAND</b>													
Total area (1000 km <sup>2</sup> )	9971	1958	9364	378	99	7713	270	84	31	79	43	338	
Major protected areas (% of total area)	2	9.6	8.2	21.2	6.8	6.9	7.7	23.5	29.2	2.8	16.2	32.0	8.4
Nitrogenous fertiliser use (t/km <sup>2</sup> of arable land)		4.1	4.4	6.2	11.5	23.1	1.7	37.3	7.6	18.8	6.8	12.3	7.1
Pesticide use (t/km <sup>2</sup> of arable land)		0.07	0.13	0.21	1.50	1.29	0.23	0.85	0.25	0.92	0.12	0.15	-
<b>FOREST</b>													
Forest area (% of land area)		45.3	33.4	32.6	66.8	65.2	19.4	29.5	47.6	22.2	34.1	10.5	75.5
Use of forest resources (harvest/growth)		0.4	0.2	0.6	0.3	0.1	..	0.6	0.6	0.9	0.7	0.6	0.8
Tropical wood imports (USD/cap.)	3	0.8	0.1	1.6	18.4	11.1	4.6	2.6	0.2	12.3	0.1	4.4	1.9
<b>THREATENED SPECIES</b>													
Mammals (% of species known)		19.2	33.2	10.5	7.7	17.0	14.9	15.2	35.4	31.6	33.3	24.0	11.9
Birds (% of species known)		10.8	16.9	7.2	8.3	15.0	6.4	25.3	37.0	27.5	66.1	10.6	6.7
Fish (% of species known)		6.4	5.7	2.4	11.1	1.3	0.4	0.8	65.5	54.3	29.2	18.2	11.9
<b>WATER</b>													
Water withdrawal (% of gross annual availability)		1.7	17.4	19.9	20.8	35.6	4.3	0.6	2.7	42.5	15.6	15.7	2.2
Public waste water treatment (% of population served)		78	22	71	55	53	..	80	75	27	59	87	77
Fish catches (% of world catches)		1.0	1.6	5.4	6.3	2.4	0.2	0.6	-	-	-	2.0	0.2
<b>AIR</b>													
Emissions of sulphur oxides (kg/cap.)		89.7	24.4	69.3	7.2	32.9	100.6	12.3	7.1	23.6	68.0	20.7	19.5
(kg/1000 USD GDP)	4	3.7	3.3	2.3	0.3	2.3	4.7	0.7	0.3	1.1	5.3	0.9	1.0
% change (1990-1998)		-19	..	-14	..	-7	-3	3	-37	-25	-63	-50	-61
Emissions of nitrogen oxides (kg/cap.)		67.8	17.2	80.2	11.3	27.6	118.3	45.9	21.3	32.8	41.1	46.9	50.5
(kg/1000 USD GDP)	4	2.9	2.3	2.7	0.5	1.9	5.5	2.7	1.0	1.5	3.2	2.0	2.5
% change (1990-1998)		-5	..	-	..	36	-4	23	-12	-3	-43	-12	-13
Emissions of carbon dioxide (t./cap.)	5	15.9	3.7	20.5	9.3	9.2	16.5	8.8	7.9	12.0	11.7	11.8	12.5
(t./1000 USD GDP)	4	0.66	0.50	0.68	0.38	0.62	0.74	0.51	0.36	0.53	0.91	0.49	0.61
% change (1990-1997)		12	14	12	10	81	16	31	8	12	-15	18	18
<b>WASTE GENERATED</b>													
Industrial waste (kg/1000 USD GDP)	4, 6	..	50	..	49	56	107	29	65	62	292	22	119
Municipal waste (kg/cap.)	7	500	310	720	400	400	690	350	510	480	310	560	410
Nuclear waste (t./Mtoe of TPES)	8	6.5	0.1	0.9	1.8	2.3	-	-	-	2.8	1.0	-	2.2
<b>PAC EXPENDITURE (% of GDP)</b>	9	1.1	0.8	1.6	1.6	1.7	0.8	..	1.7	0.9	2.0	0.9	1.1

.. not available. - nil or negligible. x data included under Belgium.

UKD:

1) Data refer to the latest available year. They include provisional figures and Secretariat estimates.

Partial totals are underlined. Varying definitions can limit comparability across countries.

2) Data refer to IUCN categories I to VI; AUS, HUN, LUX, TUR: national data

3) Total imports of cork and wood from non-OECD tropical countries.

4) GDP at 1995 prices and purchasing power parities.

Source: OECD Environmental Data, Compendium 1999.

## OECD EPR / SECOND CYCLE

FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD*	OECD*
549	357	132	93	<b>103</b>	70	301	3	42	324	313	92	506	450	41	779	245	34728
10.1	26.9	2.6	9.1	<b>9.5</b>	0.9	7.3	6.5	11.6	24.2	9.4	6.6	8.4	8.1	18.0	3.8	20.4	12.6
13.4	14.8	7.8	5.4	<b>8.9</b>	43.2	8.4	x	37.7	12.3	6.1	4.0	5.4	7.3	12.8	4.3	19.5	6.4
0.59	0.29	0.29	0.14	..	0.25	0.78	x	1.06	0.08	0.07	0.43	0.18	0.06	0.37	0.13	<b>0.58</b>	0.25
31.4	30.1	22.8	18.9	<b>1.3</b>	8.8	23.3	34.4	9.2	39.2	29.7	37.9	32.3	73.5	31.7	26.9	10.5	33.8
0.7	0.4	0.6	0.6	-	0.6	0.3	0.5	0.6	0.4	0.6	0.8	0.5	0.7	0.5	0.4	0.7	<u>0.6</u>
7.1	2.0	3.4	0.1	<b>4.0</b>	10.1	6.6	x	17.3	4.5	0.2	19.9	6.2	2.0	0.5	0.9	3.3	5.1
20.2	36.7	37.9	71.1	-	6.5	32.2	51.6	15.6	5.9	15.5	17.3	21.2	18.2	34.2	22.2	<b>22.2</b>	..
14.3	29.2	13.0	18.8	<b>13.3</b>	21.8	24.7	50.0	27.1	6.3	16.6	13.7	14.1	8.6	42.6	6.7	<b>6.8</b>	..
6.6	68.2	24.3	32.1	-	33.3	..	27.9	82.1	-	27.1	18.6	29.4	12.7	44.7	9.9	<b>11.1</b>	..
23.9	24.4	12.1	5.0	<b>0.1</b>	2.6	32.2	3.4	4.9	0.7	18.7	11.9	36.8	1.5	4.9	15.2	<b>14.6</b>	<b>11.8</b>
77	89	45	22	<b>16</b>	61	61	88	97	67	47	21	48	93	94	12	<b>88</b>	<b>59</b>
0.6	0.3	0.2	-	<b>2.4</b>	0.3	0.4	-	0.5	3.1	0.4	0.2	1.2	0.4	-	0.5	1.0	30.9
16.2	15.8	48.3	64.7	<b>32.1</b>	48.7	23.1	8.4	8.0	6.9	61.3	36.2	49.1	10.3	4.6	29.8	34.5	39.2
0.8	0.7	3.6	6.7	<b>1.3</b>	2.2	1.2	0.2	0.4	0.3	8.3	2.7	3.2	0.5	0.2	4.8	1.8	2.0
-24	-76	-	-35	<b>6</b>	-3	..	-76	-38	-42	-26	..	..	-33	-24	..	<b>-46</b>	<b>-24</b>
29.1	21.7	35.2	19.4	<b>105.6</b>	33.9	30.9	39.6	28.5	50.6	29.9	37.6	31.7	38.1	18.2	14.5	35.0	40.6
1.4	1.0	2.6	2.0	<b>4.3</b>	1.5	1.5	1.1	1.3	2.0	4.1	2.8	2.1	1.9	0.7	2.3	1.9	2.0
-10	-34	8	-17	<b>9</b>	6	..	-27	-23	2	-10	..	..	-13	-22	37	<b>-25</b>	<b>-5</b>
6.2	10.8	7.7	5.7	<b>8.9</b>	10.3	7.4	20.5	11.8	7.8	9.1	5.2	6.5	6.0	6.3	2.9	9.4	11.2
0.29	0.50	0.57	0.59	<b>0.36</b>	0.49	0.36	0.57	0.53	0.31	1.15	0.37	0.40	0.29	0.24	0.47	0.48	0.55
-4	-10	12	-14	<b>8</b>	13	4	-21	14	15	-	25	18	-	1	35	<b>-5</b>	9
84	38	47	72	<b>1</b>	66	19	136	26	27	73	3	24	86	8	87	53	71
590	460	370	490	<b>650</b>	560	460	590	560	630	320	380	390	360	600	330	480	500
4.6	1.3	-	3.2	-	-	-	-	0.2	-	..	-	0.9	4.5	2.4	-	3.7	1.6
1.4	1.5	0.8	0.7	..	0.6	0.9	..	1.8	1.2	1.1	0.7	0.8	1.2	1.6	..	1.0	..

pesticides and threatened species: Great Britain; water withdrawal and public waste water treatment: England and Wales.

5) CO<sub>2</sub> from energy use only; international marine bunkers are excluded.

6) Waste from manufacturing industries.

7) NZL: household waste only.

8) Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal, per million tonnes of oil equivalent of total primary energy supply.

9) Household expenditure excluded; HUN, POL: investments only.

## ANNEX I.B: SELECTED ECONOMIC DATA (1)

	CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN
<b>GROSS DOMESTIC PRODUCT</b>												
GDP, 1999 (billion USD at 1995 prices and PPPs)	769	755	8681	3005	703	449	66	186	240	129	132	115
% change (1990-1999)	23.2	27.8	32.3	12.8	64.8	36.3	21.7	21.1	17.8	-9.8	25.3	17.4
per capita, 1999 (1000 USD/cap.)	25.2	7.7	32.0	23.7	15.0	23.6	17.5	23.0	23.5	12.5	24.8	22.2
Exports, 1999 (% of GDP)	43.2	31.8	10.8	10.2	44.6	18.4	30.3	43.8	74.1	61.0	35.2	38.1
<b>INDUSTRY</b> 2												
Value added in industry (% of GDP)	27	26	26	37	43	26	26	30	28	37	24	30
Industrial production: % change (1990-1998)	23.0	34.0	32.7	-4.8	59.7	17.1	15.1	25.0	9.4	-24.2	26.5	42.2
<b>AGRICULTURE</b> 3												
Value added in agriculture (% of GDP)	2	6	2	2	6	3	7	1	1	4	4	4
Agricultural production: % change (1990-1999)	26.2	23.9	18.2	-8.3	-1.4	20.0	18.2	5.8	9.3	..	3.7	-14.4
Livestock population, 1999 (million head of sheep eq.)	102	266	795	56	29	289	101	18	30	16	25	9
<b>ENERGY</b> 4												
Total supply, 1998 (Mtoe)	234	148	2182	510	163	105	17	29	58	41	21	33
% change (1990-1998)	12.1	19.0	13.3	16.3	78.7	20.5	21.3	12.3	20.5	-13.4	13.8	16.1
Energy intensity, 1998 (toe/1000 USD GDP)	0.32	0.20	0.26	0.17	0.25	0.24	0.27	0.16	0.25	0.32	0.16	0.30
% change (1990-1998)	-5.7	-3.7	-11.1	4.5	18.2	-8.2	2.3	-5.2	4.2	-4.5	-8.0	2.6
Structure of energy supply, 1998 (%)												
Solid fuels	16.5	10.0	27.1	18.0	21.6	48.1	10.9	22.3	15.7	52.5	33.7	35.5
Oil	34.7	62.3	39.9	51.1	56.2	33.6	38.4	43.4	42.2	20.2	45.2	32.9
Gas	28.9	21.3	22.8	11.7	7.6	16.9	24.2	23.3	21.4	18.6	19.9	10.2
Nuclear	7.9	1.6	8.5	17.0	14.3	-	-	-	20.7	8.3	-	17.4
Hydro, etc.	12.1	4.7	1.8	2.2	0.2	1.4	26.5	11.1	0.1	0.4	1.2	4.0
<b>ROAD TRANSPORT</b> 5												
Road traffic volumes per capita, 1998 (1000 veh.-km/cap.)	9.2	0.6	15.7	6.1	1.6	10.0	7.9	7.5	8.3	3.0	8.3	8.7
Road vehicle stock, 1998 (10 000 vehicles)	1804	1389	21443	7082	1047	1126	216	471	499	377	219	231
% change (1990-1998)	9.0	40.6	13.6	25.4	208.4	15.2	16.9	27.6	17.1	45.5	15.7	4.4
per capita (veh./100 inh.)	60	15	80	56	23	60	58	58	49	37	41	45

.. not available. - nil or negligible. x data included under Belgium.

- 1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.
- 2) Value added: includes mining and quarrying, manufacturing, gas, electricity and water and construction; production: excludes construction.

Source: OECD Environmental Data, Compendium 1999.

## OECD EPR / SECOND CYCLE

FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	OECD
1306	1842	151	107	7	91	1203	17	374	114	330	152	681	192	190	400	1198	23585
14.9	17.0	20.6	2.5	28.0	76.5	11.6	58.8	26.7	34.6	36.8	24.9	22.4	12.6	5.1	35.4	19.5	24.2
22.1	22.4	14.4	10.6	26.6	24.3	20.9	38.9	23.7	25.6	8.5	15.2	17.3	21.6	26.6	6.1	20.2	21.3
25.4	28.6	18.1	51.7	34.6	82.1	25.1	114.0	60.5	38.9	24.5	30.9	27.2	43.3	40.8	23.1	25.4	20.9
26	29	20	32	22	39	31	21	27	32	39	35	32	27	..	31	28	29
8.3	5.1	7.9	16.6	..	128.2	10.9	11.9	16.7	37.8	45.3	13.1	15.4	32.4	12.6	55.0	9.6	17.2
2	1	12	7	9	5	3	1	3	2	8	4	3	2	..	14	2	3
5.2	-6.8	9.6	-21.7	-7.3	6.4	10.0	x	-5.8	-6.0	-12.4	-4.7	3.9	-7.8	-5.3	11.6	0.3	..
165	128	21	14	1	56	71	x	47	10	64	18	93	14	12	118	131	2698
256	345	27	25	3	13	168	3	74	25	96	22	113	52	27	73	233	5097
12.3	-3.2	22.3	-11.3	25.3	26.6	9.5	-7.1	11.7	18.4	-3.6	33.1	24.5	9.9	6.4	38.1	9.3	13.4
0.20	0.19	0.18	0.25	0.38	0.16	0.14	0.21	0.21	0.22	0.30	0.15	0.17	0.28	0.14	0.18	0.20	0.22
0.2	-16.1	4.8	-10.2	3.7	-22.1	-0.9	-38.5	-9.2	-11.6	-27.1	9.8	5.5	1.4	2.6	-0.3	-6.9	-6.1
10.8	25.5	36.8	17.8	2.6	23.3	8.2	5.2	13.4	9.3	71.0	19.4	18.6	19.9	5.9	40.1	18.4	23.9
35.5	40.6	58.8	28.9	31.2	54.9	56.9	72.3	37.5	34.0	18.9	72.0	54.7	30.5	49.8	42.0	35.9	41.9
12.8	21.1	2.7	38.8	-	21.2	31.1	22.2	47.6	17.1	9.8	3.2	10.3	1.3	8.7	12.4	34.2	20.6
38.8	12.2	-	14.4	-	-	-	-	1.4	-	-	-	13.7	36.2	24.9	-	11.3	10.9
2.1	0.5	1.7	0.1	66.2	0.7	3.8	0.4	0.1	39.5	0.2	5.5	2.7	12.1	10.7	5.5	0.2	2.8
8.3	7.3	5.6	2.7	6.5	8.1	8.6	9.0	6.9	7.0	3.3	5.5	4.1	8.2	7.1	0.8	7.7	7.9
3230	4427	365	273	16	138	3433	28	732	221	1055	425	1927	415	367	516	2997	56468
13.5	18.7	44.8	24.3	17.8	45.3	12.3	33.6	27.7	13.9	64.9	93.4	33.4	5.6	11.2	118.5	14.0	20.1
55	54	35	27	58	37	60	66	47	50	27	43	49	47	52	8	51	51

3) Agriculture, forestry, hunting, fishery, etc.

4) Breakdown excludes electricity trade.

5) Refers to motor vehicles with four or more wheels, except for Japan and Italy, which include three-wheeled goods vehicles.

## ANNEX I.C: SELECTED SOCIAL DATA (1)

	CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN
<b>POPULATION</b>												
Total population, 1999 (100 000 inh.)	305	975	2713	1267	469	190	38	81	102	103	53	52
% change (1990-1999)	9.9	18.1	8.6	2.5	9.3	11.2	12.4	4.9	2.6	-0.7	3.6	3.6
Population density, 1999 (inh./km <sup>2</sup> )	3.1	49.8	29.0	335.4	471.8	2.5	14.0	96.5	335.0	130.4	123.5	15.3
Ageing index, 1998 (over 64/under 15)	62.4	14.9	53.6	107.6	29.9	58.2	51.4	90.4	91.3	79.3	82.5	79.1
<b>HEALTH</b>												
Women life expectancy at birth, 1998 (years)	81.4	77.3	79.4	84.0	78.1	81.5	80.4	80.9	81.1	78.1	78.6	80.8
Infant mortality, 1998 (deaths /1 000 live births)	5.5	15.8	7.2	3.6	7.7	5.0	6.8	4.9	6.0	5.2	4.7	4.2
Expenditure, 1998 (% of GDP)	9.5	4.7	13.7	7.6	5.0	8.5	8.1	8.3	8.8	7.6	8.3	6.9
<b>INCOME AND POVERTY</b>												
GDP per capita, 1999 (1000 USD/cap.)	25.2	7.7	32.0	23.7	15.0	23.6	17.5	23.0	23.5	12.5	24.8	22.2
Poverty (% pop. < 50% median income)	10.3	21.9	17.1	8.1	..	9.3	..	7.4	7.8	..	5.0	4.9
Inequality (Gini levels)	2	28.5	52.6	34.4	26.0	..	30.5	25.6	23.8	27.2	..	21.7
Minimum to median wages, 1997	3	39.6	..	38.1	30.8	24.4	x	45.6	x	50.4	21.2	x
<b>EMPLOYMENT</b>												
Unemployment rate, 1999 (% of total labour force)	7.6	2.5	4.2	4.7	6.3	7.2	6.8	5.3	9.0	8.8	5.5	10.2
Labour force participation rate, 1999 (% 15-64 year-olds)	76.9	56.8	78.0	78.1	64.2	74.4	65.3	77.5	63.7	80.4	80.5	74.0
Employment in agriculture, 1998 (%)	4	3.7	19.4	2.7	5.3	12.2	4.8	8.5	6.6	2.4	5.5	3.6
<b>EDUCATION</b>												
Education, 1998 (% 25-64 year-olds)	5	79.7	21.2	86.5	79.9	65.4	56.0	72.7	73.3	56.7	85.3	78.4
Expenditure, 1997 (% of GDP)	6	6.5	5.5	6.9	4.8	7.4	5.6	..	6.5	5.2	5.2	6.8
<b>OFFICIAL DEVELOPMENT ASSISTANCE</b>												
ODA, 1999 (% of GNP)	7	0.28	..	0.10	0.35	..	0.26	0.27	0.26	0.30	..	1.00
ODA, 1999 (USD/cap.)	56	..	34	121	..	52	35	65	74	..	324	78

.. not available. - nil or negligible. x not applicable.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Ranging from 0 (equal) to 100 (inequal) income distribution; figures relate to total disposable income (including all incomes, taxes and benefits) for the entire population.

3) Minimum wage as a percentage of median earnings including overtime pay and bonuses.

Source: OECD Environmental Data, Compendium 1999.

## OECD EPR / SECOND CYCLE

FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	OECD
591	822	105	101	3	37	577	4	158	44	387	100	394	89	71	659	594	11086
4.2	3.6	4.4	-2.8	8.3	6.6	1.7	12.3	5.6	4.8	1.5	1.3	1.5	3.7	6.4	17.3	3.2	6.8
107.6	230.2	79.8	108.3	2.7	53.1	191.5	167.0	380.0	13.7	123.8	108.7	77.9	19.7	172.9	84.6	242.7	31.9
82.6	107.1	95.2	83.3	49.0	50.4	106.6	76.1	73.0	79.3	56.8	90.3	105.2	93.3	86.0	16.8	81.7	60.5
82.2	80.5	80.5	75.2	81.5	78.5	81.6	80.0	80.7	81.3	77.3	78.8	82.4	81.9	82.5	71.3	79.7	..
4.7	4.7	6.7	8.9	2.6	6.2	6.2	5.0	5.2	4.0	9.5	6.0	5.0	3.6	4.8	36.3	5.7	..
9.6	10.5	8.3	6.8	8.4	6.1	8.4	5.9	8.6	8.9	6.3	7.8	7.1	8.4	10.4	4.0	7.0	..
22.1	22.4	14.4	10.6	26.6	24.3	20.9	38.9	23.7	25.6	8.5	15.2	17.3	21.6	26.6	6.1	20.2	21.3
7.5	9.4	13.9	7.3	..	11.0	14.2	..	6.3	8.0	..	..	..	6.4	..	16.2	10.9	..
27.8	28.2	33.6	28.3	..	32.4	34.5	..	25.5	..	..	..	..	23.0	..	49.1	31.2	..
57.4	x	..	37.4	x	x	x	..	49.4	x	44.6	..	32.4	x	x	..	x	..
11.1	9.0	10.7	7.1	1.9	5.5	11.5	2.9	3.2	3.2	12.0	4.4	15.9	5.6	2.7	7.3	5.9	6.6
68.0	71.1	61.9	58.4	77.5	68.1	59.3	63.3	65.5	81.2	68.6	70.6	63.9	75.9	81.3	55.7	75.6	71.0
4.4	2.8	17.7	7.6	8.6	9.1	6.6	2.3	3.3	4.7	19.2	13.6	8.0	2.6	4.6	42.3	1.7	7.8
60.7	83.8	44.1	63.3	54.8	51.3	41.0	..	64.3	83.0	54.3	20.1	32.9	76.1	81.5	17.7	60.2	61.2
6.3	5.7	4.9	5.2	5.7	5.0	4.8	..	4.7	..	..	5.8	5.7	6.9	6.0	..	..	5.8
0.38	0.26	0.21	..	..	0.31	0.15	0.64	0.79	0.91	..	0.25	0.23	0.70	0.35	..	0.23	0.24
93	67	25	..	..	65	30	266	199	308	..	27	34	184	136	..	55	67

4) Civil employment in agriculture, forestry and fishing.

5) Upper secondary or higher education; OECD: average of rates.

6) Public and private expenditure on educational institutions; OECD: average of rates.

7) Official Development Assistance by Member countries of the OECD Development Assistance Committee.

**ANNEX II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)**

Y = in force S = signed R = ratified D = denounced

		CAN	MEX	USA		
1946	Washington	Conv. - Regulation of whaling	Y	D	R	R
1956	Washington	Protocol	Y	R	R	R
1954	London	Conv. - Prevention of pollution of the sea by oil	Y	R	R	R
1957	Brussels	Conv. - Limitation of the liability of owners of sea-going ships	Y	S		
1979	Brussels	Protocol	Y			
1958	Geneva	Conv. - Fishing and conservation of the living resources of the high seas	Y	S	R	R
1964	Copenhagen	Conv. - International council for the exploration of the sea	Y	R		R
1970	Copenhagen	Protocol	Y	R		R
1969	Brussels	Conv. - Intervention on the high seas in cases of oil pollution casualties (INTERVENTION)	Y		R	R
1973	London	Protocol (pollution by substances other than oil)	Y		R	R
1969	Brussels	Conv. - Civil liability for oil pollution damage (CLC)	Y	R	D	S
1976	London	Protocol	Y	R	R	
1992	London	Protocol	Y	R	R	
1971	Brussels	Conv. - International fund for compensation for oil pollution damage (FUND)	Y	R	D	S
1976	London	Protocol	Y	R	R	
1992	London	Protocol	Y	R	R	
1971	Ramsar	Conv. - Wetlands of international importance especially as waterfowl habitat	Y	R	R	R
1982	Paris	Protocol	Y	R	R	R
1987	Regina	Regina amendment	Y	R	R	
1971	Geneva	Conv. - Protection against hazards of poisoning arising from benzene (ILO 136)	Y			
1972	London, Mexico, Moscow, Washington	Conv. - Prevention of marine pollution by dumping of wastes and other matter (LC)	Y	R	R	R
1996	London	Protocol to the Conv. - Prevention of marine poll. by dumping of wastes and other matter				S
1972	Geneva	Conv. - Protection of new varieties of plants (revised)	Y	R	R	R
1978	Geneva	Amendments	Y	R	R	R
1991	Geneva	Amendments	Y			R
1972	Paris	Conv. - Protection of the world cultural and natural heritage	Y	R	R	R
1973	Washington	Conv. - International trade in endangered species of wild fauna and flora (CITES)	Y	R	R	R
1974	Geneva	Conv. - Prev. and control of occup. hazards caused by carcinog. subst. and agents (ILO 139)	Y			
1976	London	Conv. - Limitation of liability for maritime claims (LLMC)	Y		R	
1996	London	Amendment to convention		S		
1977	Geneva	Conv. - Protection of workers against occupational hazards in the working environment due to air pollution, noise and vibration (ILO 148)	Y			
1978	London	Protocol - Prevention of pollution from ships (MARPOL PROT)	Y	R	R	R
1978	London	Annex III	Y			R
1978	London	Annex IV				
1978	London	Annex V	Y		R	R
1997	London	Annex VI				
1979	Bonn	Conv. - Conservation of migratory species of wild animals	Y			

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	EU
R	R	R	R	R			R	R	R	R			D	R	R		R	R				R	R	R		R
R	R	R	R				R		R	R			R	R			R	R				R	R	R		R
R	R	R	R	R	R		R	R	R	R	R		R	R	R		R	R	R	R	R	R	R	R		R
D		D			D		D	D	D	D			R		S	R	D	D	R	R	R	R	D	R		D
		R			R			S		S						R				R	R	R		R		D
		R	S		R		R	R	R				S	S			R				R	R		R		R
					R		R	R	R	R			R	R			R	R	R	R	R	R	R			R
					R		R	R	R	R			R	R			R	R	R	R	R	R	R			R
R	S	R	R		R		R	R	R	R	S		R	R	R		R	R	R	R	R	R	R	R		R
		R	S		R		R	R	R	R				R	R		R	R	R	R	R	R	R	R		R
D	D	D	R		R		D	D	D	D	D		R	D	R	R	D	D	R	R	D	D	D	D		D
R	R	R			R		R	R	R	R	R		R	D	R		R	R	R	R	R	R	R	R		D
R	R	R	R		R		R	R	R	R	R		R	R			R	R	S		R	R	R		R	
D	D	D	R		R		D	D	D	D	D		R	D	R		D	D	R	R	D	D	D		D	
R		R			R		R	R	R	R	R		R	D	R		R	R	R	R	R	R				D
R	R	R	R		R		R	R	R	R	R		R	R			R	R	S		R	R				R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	R				R	R	R	R
					R		R	R	R	R	R			R								R		R		
R	R	R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R
		S	S		S		R	S		R			S				S	S				R	S	S		R
R		R	R	R	R	R	R	R	R	R		R		R	R		R	R	R	R	R	R	R	R		R
R		R	R	R			R	R	R	R	R		R		R	R		R	R	R	R		R	R		R
R		R					R			R							R					R				R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R					R	R	R	R	R	R		R	R	R	R		R		R		R		R	R		
R		R	R		R		R	R	R	R	R			R			R	R	R			R	R	R	R	R
							S	S	S	S							S	S				S				S
					R	R	R	R	R	R		R			R			R		R	R	R				R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R				R	R	R	R	R	R	R	R	R			R	R			R	R	R	R	R	R		R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
		R			R	R	R	R	R	R	R		R	R			S					S				
		R			R	R	R	R	R	R	R		R	R			R	R	R	R	R	R	R	R		R



**ANNEX II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE) (cont.)**

Y = in force S = signed R = ratified D = denounced

		CAN	MEX	USA
1982 Montego Bay	Conv. - Law of the sea	Y	S	R
1994 New York	Agreem. - relating to the implementation of part XI of the convention	Y	S	S
1995 New York	Agreem. - Implementation of the provisions of the convention relating to the conservation and management of straddling fish stocks and highly migratory fish stock:	R		R
1983 Geneva	Agreem. - Tropical timber	Y	R	R
1994 New York	Revised agreem. - Tropical timber	Y	R	R
1985 Vienna	Conv. - Protection of the ozone layer	Y	R	R
1987 Montreal	Protocol (substances that deplete the ozone layer)	Y	R	R
1990 London	Amendment to protocol	Y	R	R
1992 Copenhagen	Amendment to protocol	Y	R	R
1997 Montreal	Amendment to protocol	Y	R	
1989 Basel	Conv. - Control of transboundary movements of hazardous wastes and their disposal	Y	R	S
1995 Geneva	Amendment			
1999 Basel	Prot. - Liability and compensation for damage			
1989 London	Conv. - Salvage	Y	R	R
1990 Geneva	Conv. - Safety in the use of chemicals at work (ILO 170)	Y		R
1990 London	Conv. - Oil pollution preparedness, response and co-operation (OPRC)	Y	R	R
1992 Rio de Janeiro	Conv. - Biological diversity	Y	R	S
2000 Montreal	Prot. - Biosafety			S
1992 New York	Conv. - Framework convention on climate change	Y	R	R
1997 Kyoto	Protocol	S	S	S
1993 Paris	Conv. - Prohibition of the development, production, stockpiling and use of chemical weapons and their destruction	Y	R	S
1993 Geneva	Conv. - Prevention of major industrial accidents (ILO 174)	Y		
1993	Agreem. - Promote compliance with international conservation and management measures by fishing vessels on the high seas	R	R	R
1994 Paris	Conv. - Combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa	Y	R	S
1996 London	Conv. - Liability and compensation for damage in connection with the carriage of hazardous and noxious substances by sea	S		
1996 The Hague	Agreem. - Conservation of African-Eurasian migratory waterbirds			
1998 Rotterdam	Conv. - Prior informed consent procedure for hazardous chemicals and pesticides (PIC)			S

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	EU	
R	R	R	R	R	R	R	S	R	R	R	R	S	R	R	R	S	R	R	R	R	R	R	S		R	R	
R	R	R	R	R	R	R	S	R	R	R	R		R	R	R	S	R	R	R	R	R	R	S		R	R	
S	S	S	S	S	S		S	S	S	S	S		R	S	S	S	S	R		S	S	S			S	S	
R	R	R	R	R	R		R	R	R	R	R			R	R	R	R	R		R	R	R	R			R	R
R	R		R	R	R		R	R	R	R	R			R	R	R		R		R	R	R	R			R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	S					R	R				R	R		R		R	R	R					
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
				R		R	R	R								R		R		R	R	R				R	R
																S								S			
		R					R	S		S	R			R	R		R	R	S		S	R	R			R	
																R					R						
R		R					R	R	R	R	R		R	R	R		R	R	S		R	R	R			R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	S		S	S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R
S	S	S	S	S	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S	S	S		S	S
R	S	R	R	R	R	R	R	R	R	R	R	R	S	R	R	S	R	R	R	R	R	R	R	R	S	S	
					S													R					R				
																		R					R				R
R	R	S		R	R		R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R
							S	S		S								S	S				S			S	
					S					S		S		S				S									
S	S	S	S	S	S	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S	S	S	S	S

**ANNEX II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)**

Y = in force S = signed R = ratified D = denounced

		CAN	MEX	USA
1920	Treaty - Spitsberg	Y		
1933 London	Conv. - Preservation of fauna and flora in their natural state	Y		
1940 Washington	Conv. - Nature protection and wild life preservation in the Western Hemisphere	Y	R	R
1946 London	Conv. - Regulation of the meshes of fishing nets and the size limits of fish	Y		
1958 Dublin	Amendments	Y		
1960 London	Amendments	Y		
1961 Copenhagen	Amendments	Y		
1962 Hamburg	Amendments	Y		
1963 London	Amendments	Y		
1950 Paris	Conv. - Protection of birds	Y		
1958 Geneva	Agreem. - Adoption of uniform conditions of approval and reciprocal recognition of approval for Y motor vehicle equipments and parts	Y		
1959 Washington	Treaty - Antarctic	Y	R	R
1991 Madrid	Protocol to the Antarctic treaty (environmental protection)	Y	S	R
1964 Brussels	Agreem. - Measures for the conservation of Antarctic Fauna and Flora	Y		R
1964 London	Conv. - Fisheries	Y		
1966 Rio de Janeiro	Conv. - International convention for the conservation of Atlantic tunas (ICCAT)	Y	R	R
1967 London	Conv. - Conduct of fishing operations in the North Atlantic	Y	S	S
1968 Strasbourg	Agreem. - Restriction of the use of certain detergents in washing and cleaning products	Y		
1983 Strasbourg	Protocol	Y		
1968 Paris	Conv. - Protection of animals during international transport	Y		
1979 Strasbourg	Protocol	Y		
1969 London	Conv. - Protection of the archaeological heritage	Y		
1972 Oslo	Conv. - Prevention of marine pollution by dumping from ships and aircraft	Y		
1983	Protocol	Y		
1972 London	Conv. - Conservation of Antarctic seals	Y	R	R
1973 Oslo	Agreem. - Conservation of polar bears	Y	R	R
1974 Stockholm	Conv. - Nordic environmental protection	Y		
1974 Paris	Conv. - Prevention of marine pollution from land-based sources	Y		
1986 Paris	Protocol	Y		
1992 Paris	Conv. - Protection of North-East Atlantic marine env. (replace Oslo-1972 and Paris-1974)	Y		
1978 Ottawa	Conv. - Future multilateral co-operation in the Northwest Atlantic fisheries (NAFO)	Y	R	
1979 Bern	Conv. - Conservation of European wildlife and natural habitats	Y		
1979 Geneva	Conv. - Long-range transboundary air pollution	Y	R	R
1984 Geneva	Protocol (financing of EMEP)	Y	R	R
1985 Helsinki	Protocol (reduction of sulphur emissions or their transboundary fluxes by at least 30%)	Y	R	
1988 Sofia	Protocol (control of emissions of nitrogen oxides or their transboundary fluxes)	Y	R	R
1991 Geneva	Protocol (control of emissions of volatile organic compounds or their transboundary fluxes)	Y	S	S
1994 Oslo	Protocol (further reduction of sulphur emissions)	Y	R	
1998 Aarhus	Protocol (heavy metals)		R	S
1998 Aarhus	Protocol (persistent organic pollutants)		R	S
1999 Gothenburg	Protocol (abate acidification, eutrophication and ground-level ozone)		S	S

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	EU		
					R				S			R		R						S	R				R			
					R		R		R	R			R	R			R	R		R	R	R				R		
					R		R		R	R			R	R			R	R	R	R	R	R				R		
					R		R		R	R			R	R			R	R	R	R	R	R				R		
					R		R		R	R			R	R			R	R	R	R	R	R				R		
					R		R		R	R			R	R			R	R	R	R	R	R				R		
					S	R			S		S		R		R	R	R			S	R	R	R	R	R			
					R	R	R	R	R	R		R			R	R	R	R	R	R	R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	R	R			R		R	R	R		R	R	R	R	R	R	R	
R	R	R	R	S	R	S	S	R	R	R	R	S			R		R	R	R		R	R	S			R		
R		R	R		R				R						R				R	R							R	
R	R				R				R	R				R	R	S	R		R		R	R	R				R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R					R	
					R		R		R	R			R	S	R		R	R	S	R	R	R						

**ANNEX II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL) (cont.)**

Y = in force S = signed R = ratified D = denounced

		CAN	MEX	USA
1980 Canberra	Conv. - Conservation of Antarctic marine living resources	Y	R	R
1980 London	Conv. - Multilateral co-operation in North-East Atlantic fisheries	Y		
1982 Paris	Memorandum of understanding on port state control	Y	R	
1982 Reykjavik	Conv. - Conservation of salmon in the North Atlantic Ocean	Y	R	R
1989 Stockholm	Agreem. - Transboundary co-operation with a view to preventing or limiting harmful effects for human beings, property or the environment in the event of accidents	Y		
1991 Espoo	Conv. - Environmental impact assessment in a transboundary context	Y	R	S
1992 Nuuk	Agreem. - Co-op. on research, conservation and manag <sup>d</sup> of marine mammals in the N. Atlantic			
1992 La Valette	European Conv. - Protection of the archaeological heritage (revised)	Y		
1992 Vienna	Agreem. - Forecast, prevention and mitigation of natural and technological disasters			
1993 Lugano	Conv. - Civil liability for damage resulting from activities dangerous to the environment			
1993 Copenhagen	Agreem. - Co-op. in the prevention of marine poll. from oil and other dangerous chemicals	Y		
1994 Lisbon	Treaty - Energy Charter	Y		
1994 Lisbon	Protocol (energy efficiency and related environmental aspects)	Y		
1998 Aarhus	Conv. - Access to env <sup>nal</sup> information and public participation in env <sup>nal</sup> decision-making			
1998 Strasbourg	Conv. - Protection of the environment through criminal law			
2000 Florence	Conv. - European lanscape convention			

Source: IUCN; OECD.

**OECD EPR / SECOND CYCLE**

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	ESP	SWE	CHE	TUR	UKD	EU
R	R	R	R	R			R	R	R	R	R		R		R		R	R	R	R	R	R			R	R
					R		R	R	R	R	R		R	R	R		R	R	R	R	R	R			R	R
							R	R					R					R				R				R
							R	R					R						R				R			R
							R	R					R						R				R			R
				R	R	S	R	R	S	S	R	R	S	S	R	R	R	R	R	R	R	R	R	R	R	R
													S					S								R
						S	S	R	R	S	S	R		R	S	S	S	R	R	R	S	R	R	S	S	
	S										S		S		S	S	S		S							
							S				S		S		S	S				S						
							R	R					R					R					R			
S		S		R	R	R	R	R	R	R	R	R	S	R	R	R	R	S	S	R	R	R	R	S	R	R
S		S		R	R	R	R	R	R	R	R	R	S	R	R	R	R	S	S	R	R	R	R	S	R	R
				S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
				S	S		S	S	S	S	S		S			S						S				S
					S		S	S	S						S	S		S		S	S		S	S		

### **Annex III**

## **CHRONOLOGY OF SELECTED ENVIRONMENTAL EVENTS (1990-2000)**

### **1990**

- The Ministry for the Environment is established.

### **1992**

- Iceland's National Report to UNCED, the country's first state of the environment report, is published.
- A law on the Natural History Institute and nature centres is adopted.

### **1993**

- Iceland joins the European Economic Area.
- The National Environmental Strategy, "Towards Sustainable Development", is adopted.
- The first Environmental Impact Assessment Act is adopted.
- The Public Access to Environmental Information Act is adopted.

### **1994**

- The Protection and Hunting of Wild Species Act is adopted.
- Comprehensive pollution control regulations take effect.
- A hunting licence system is established.

### **1995**

- The Ministry for the Environment takes over avalanche monitoring and protection, by decision of the Althing (Parliament).
- Responsibility for marine pollution control is moved from the Shipping Agency to the Environment and Food Agency.
- The Act on Financial Support to Municipalities for Sewage Control is adopted.
- A law on the protection of Breiafjörur Bay is adopted.

- The Foodstuffs Act is adopted.
- The government launches an action programme on climate change.
- Nature centres for southern and eastern Iceland are established as co-operative ventures between the national and municipal governments.

### 1996

- Over 200 people attend Iceland's first Environmental Assembly. The assembly considers a draft National Agenda 21 and adopts it under the title "Sustainable Development in Icelandic Society – An Action Programme".
- The Genetically Modified Organisms Act is adopted.
- The Act on a Special Fee on Hazardous Waste is adopted.
- A new law concerning nature conservation is adopted, changing the administrative structure of nature conservation matters. A new body, the Nature Conservation Agency, is established under the Ministry for the Environment, replacing the Nature Conservation Council.
- A new regulation on protection of the marine environment from pollution from ships takes effect, replacing 1984 regulations.
- An office of Conservation of Arctic Flora and Fauna, a co-operative project of eight Arctic countries, opens in Akureyri.
- Agreement is reached on establishment of the Arctic Council, with Iceland being one of eight member states.
- Iceland and 42 other countries sign an international agreement on the dumping of waste from ships, an amendment to the 1972 London Convention.

### 1997

- The Geodetic Surveys and Mapping Act is adopted.
- The Planning and Building Act is adopted.
- The government adopts "Environment Policy in Government Operations", a policy paper based on OECD Recommendations on the "greening of government".
- Iceland signs the OSPAR Convention.

### 1998

- The Public Health and Pollution Control Act is adopted.
- The Ministry for the Environment and the Council of Municipalities sign an agreement on a Local Agenda 21 project.



- The Ministry for the Environment takes over fire protection matters.
- The Stefansson Arctic Institute is opened in Akureyri.
- A committee publishes proposals on how to define and protect “unspoilt wilderness areas”.
- The Frigg company becomes the first Icelandic company to be awarded the Nordic Environment Label (the White Swan).
- Iceland signs the Aarhus Convention.
- Regulations on off-road driving are made stricter.

### 1999

- A new, comprehensive Nature Conservation Act is adopted.
- The Regional Plan for the Central Highlands is adopted.
- A comprehensive survey of pollution in Icelandic waters is published.
- A review of Iceland’s National Agenda 21 is published.
- An office of Protection of the Arctic Marine Environment, a programme under the Arctic Environment Protection Strategy, is opened in Akureyri.
- An Icelandic “Environment Day” is commemorated for the first time on 25 April, after a government decision in co-operation with environmental NGOs.

### 2000

- A programme to increase waste reuse and recycling is launched, overseen by a special committee.
- A revised Environmental Impact Assessment Act is adopted.

## Annex IV

### THE PHYSICAL CONTEXT

Iceland is just south of the Arctic Circle. The capital, Reykjavik, is the most northern capital of any OECD country. Relatively warm winters and cool summers characterise Iceland's oceanic climate. The average temperature varies from  $-3$  to  $+3$  °C in January and from  $+8$  to  $+15$  °C in July. Storms and rains are frequent, with annual precipitation ranging from below 400 mm to above 4 000 mm per year, depending on location, and averaging 805 mm per year in Reykjavik.

Iceland's *topography* is characterised by mountains cut by fjords and valleys in the central highlands, and lowlands along the coast. Fast-flowing rivers transport vast volumes of water and provide major potential for hydropower development. Glaciers, rivers and lakes cover some 13 000 km<sup>2</sup> (13%) of the total area, resulting in abundant freshwater supplies. Total area is 103 000 km<sup>2</sup>. Iceland's average height above sea level is 500 metres; the highest point is 2 119 metres.

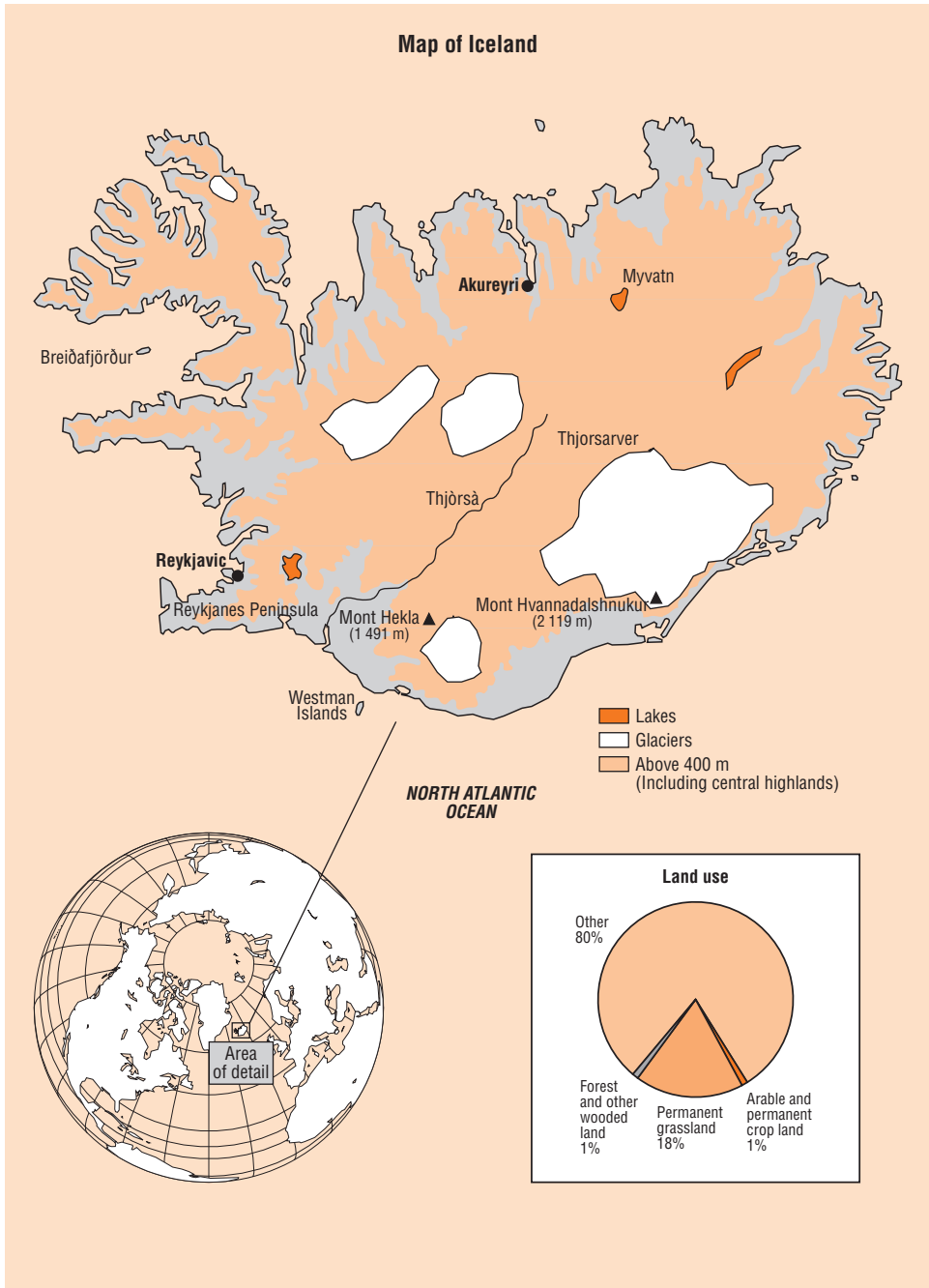
Half of the country's surface has sparse to good *vegetation* cover, despite evidence of thriving birch forests in the past. Around 60% of vegetation cover is dryland vegetation and wetlands. Remnants of the old woodlands today cover less than 1% of the total surface area, or 1 000 km<sup>2</sup>. Arable and permanent crop land amounts to approximately 1 300 km<sup>2</sup> (1%).

The country spans the mid-Atlantic ridge and is young in geological terms. It is built almost exclusively of volcanic rock, lava and sediment, and has volcanic and seismic activity. This activity has had serious environmental consequences and caused human casualties. To improve public preparedness and mitigate the risk of natural disasters, the country has been divided into zones of probable largest earthquake accelerations, to which special building codes apply. Extensive monitoring techniques have been introduced to record seismic activity, measure ground deformations and map the most likely effects of lava flows.

Iceland is rich in *geothermal energy*. Two main types of thermal areas can be distinguished on the basis of the maximum subsurface temperature of thermal water. The "low-temperature" areas are characterised by hot-water springs, which are common all over the country except in the east and south-east. Steam fields in the "high-temperature" areas generate a total natural heat discharge of several thousand megawatts.

Iceland's *coastline* is surrounded by a continental shelf connected to neighbouring countries by submarine ridges. The coastline extends over 6 000 kilometres and the continental shelf covers an area of 115 000 km<sup>2</sup>. The Reykjanes ridge extends out into the North Atlantic and forms part of the mid-Atlantic ridge and the transoceanic rift system.

The seas around Iceland provide a rich diversity of *marine resources* in the country's 758 000 km<sup>2</sup> of marine waters. The abundance of marine plants and animals results from the influence of the Gulf Stream and the mixing of the warmer waters of the Atlantic with cold Arctic waters. Approximately 270 fish species have been found within the Icelandic 200-mile exclusive economic zone; about 150 of these are known to spawn in the area. Throughout the year, marine life in Icelandic waters shows great seasonal changes. These follow the cycles of production of phytoplankton and subsequently zooplankton, which is the main food for fish larvae, pelagic fish (i.e. those living near the surface of the sea as opposed to demersal fish, which live in deep water) and baleen whales. The demersal invertebrate fauna offer a rich source of food for demersal fish such as cod, haddock, plaice and halibut. There are also several species of whales and two species of seals.



OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16  
PRINTED IN FRANCE  
(97 2001 03 1P) ISBN 92-64-18587-9 – No. 51653 2001