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NOTE

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Preface

The ECE Committee on Environmental Policy launched the Environmental Performance Review of Slovenia in January 1996. Two months later, the preparatory mission for the project was organized, and a team of both national and ECE experts was formed to carry out the review. The Governments of Albania, Hungary, Israel, Norway, Poland, Slovakia and Switzerland made national experts available for the task. The Bilthoven Division of the WHO European Centre for Environment and Health contributed its expertise and resources for the preparation of the review of environmental health issues. The travel expenses of experts from countries in transition and from the ECE secretariat were covered by extra-budgetary funds, which had been provided by Austria, Finland, France, Netherlands and Norway. The successful conclusion of the project would not have been possible without the generous support from all these sources.

The review team prepared a report on the environmental performance of Slovenia before, during and after the review mission in Ljubljana in November 1996. The Slovene partners in discussion with the review team did not spare time or effort in responding to the queries and requests made. The review mission could therefore benefit from optimal cooperation with Slovene institutions. The report by the review team, including draft recommendations for the solution of exisiting problems in national environmental policy and management, was submitted for evaluation by the ECE Committee on Environmental Policy at its fourth annual session in Geneva, on 26 May 1997. A high-level delegation from Slovenia attended this session. It was headed by the Minister of the Environment and also included the State Secretaries for Agriculture, Forest and Food, Economic Affairs, Environment, Physical Planning, Transport and Communications, and other delegates. The evaluation by the Committee was based on the in-depth preparation by two reviewing countries, the Netherlands and Poland. At the end of its evaluation, the Committee agreed on a final set of recommendations, replacing the draft recommendations of the review team for inclusion in this publication.

The ECE Committee on Environmental Policy and the ECE review team wish the Slovene environmental managers success in implementing and following up the policy recommendations in this review.

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The preparatory mission for the project took place on 25-26 March 1996. The review mission was organized from 17 to 27 November, 1996, and the peer review was held in Geneva on 26 May 1997. The ECE Committee on Environmental Policy adopted the recommendations as set out in this publication.

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ABBREVIATIONS AND SIGNS

Abbreviations

AOC	*Appellation d'origine contrôlée* (Registered designation of origin)
AQG	Air Quality Guideline
BAT	Best available technologies
BATNEEC	Best available technologies not entailing excessive cost
BOD	Biochemical oxygen demand
BS	British standard
CEFTA	Central European Free Trade Agreement
CFC	Chlorofluorocarbon
CHP	Combined heat and power (plant)
CITES	Convention on International Trade in Endangered Species of Wild Fora and Fauna
COD	Chemical oxygen demand
CPI	Consumer price index
DIN	Deutsche Industrie Norm
DM	Deutsche mark
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECE	United Nations Economic Commission for Europe
ECU	European currency unit
EECONET	European Ecological Network
EFTA	European Free Trade Association
EIA	Environmental impact assessment
EIB	European Investment Bank
EMAS	Environmental management and audit scheme
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EPA	Environmental Protection Act
EPR	Environmental Performance Review
EU	European Union
FDI	Foreign direct investment
FGD	Flue-gas desulphurization
GDP	Gross domestic product
GEF	Global Environmental Facility
GEMS	Global Environmental Monitoring System
GNP	Gross national product
HP	Heating plant
HPP	Hydropower plant
IEA	International Energy Agency
IFI	International financial institution
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	World Conservation Union
LPG	Liquefied petroleum gas
LU	Livestock unit
MAP	Mediterranean Action Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MoEPP	Ministry of Environment and Physical Planning
NEAP	National Environmental Action Plan
NGO	Non-governmental organization
NMVOC	Non-methane volatile organic compound
NPP	Nuclear power plant
NRP	National Research Programme
ODS	Ozone-depleting substances
OECD	Organisation for Economic Co-operation and Development

PCB	Polychlorinated biphenyl
PCDD	Dioxin
PHARE	Assistance for Economic Restructuring in the Countries of Central and Eastern Europe
R&D	Research and development
REC	Regional Environmental Center for Central and Eastern Europe
SITC	Standard International Trade Classification
Slt	Slovene tolar / Slovene national currency
SMEs	Small and medium-size enterprises
TPES	Total primary energy supply
TPP	Thermal power plant
UAA	Unit of agricultural area
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
US$	United States dollar
US/EPA	United States Environmental Protection Agency
VAT	Value-added tax
VOC	Volatile organic compound
WHO	World Health Organization
WTO	World Trade Organization

Signs and measures

..	not available
-	nil or negligible
.	decimal point
ha	hectare
t	metric tonne
g	gram
kg	kilogram
mg	milligram
µg	microgram
ng	nanogram
m^2	square metre
m^3	cubic metre
km	kilometre
km^2	square kilometre
toe	ton oil equivalent
l	litre
ml	millilitre
min	minute
s	second
PJ	petajoule
GJ	gigajoule
kW_{el}	kilowatt (electric)
kW_{th}	kilowatt (thermal)
MW_{el}	megawatt (electric)
MW_{th}	megawatt (thermal)
Mwh	megawatt-hour
TWh	terawatt-hour
Bq	becquerel
y	year
cap	capita

Currency

Monetary unit: Slovene tolar (Slt)
Exchange rates:[1]

Annual average (in tolars)

Year	1 US$	1 ECU	1 DM
1992	81.287	105.079	52.128
1993	113.242	132.280	68.430
1994	128.809	152.362	79.374
1995	118.519	153.118	82.661
1996	135.365	169.510	89.976

Source: Bank of Slovenia.
1. The Slovene National Currency, the tolar, was introduced in October 1991.

Introduction

FEATURES OF SLOVENIA

1. Physical structure

Topography. The Republic of Slovenia is a country with a total area of 20,255 km^2, bordering Italy (232 km), Austria (330 km), Hungary (102 km) and Croatia (670 km). Its coastline on the Adriatic Sea is 46.6 km long. There are different geological and climatic zones. The country is generally mountainous, with average altitudes of 300-550m. The north forms part of the Alps with peaks over 2000 m, of which the highest is the Triglav (2,864 m). Western Slovenia is a karstic plateau, the south, along the borders of Croatia, is hilly and the north-east is part of the Pannonian plain. An active seismic fault-line, resulting from tensions between the Pannonian, Alpine and Dinaric plates, which crosses Greece, Yugoslavia, Croatia, Slovenia and Italy, runs through the country from east to west. Although severe earthquakes are very rare, Slovenia is nevertheless located in an area with high seismic risk.

Climate. In the south-west, the climate is influenced by the Mediterranean, with hot, dry summers and temperate winters. The climate in the north is alpine with moderate summers and cold winters. Mean annual precipitation (including snow) ranges from 1000 mm on the coast to 1600 mm in most parts of the country, with higher values in the southern Julian Alps (2600 mm) and lower values in the north-eastern continental climate (800 mm).

Table I.1 Mean temperatures in January and July
[+ C]

	January	July
Mediterranean and sub-mediterranean climate zone	3 / 5	21 / 23
Continental and alpine climate zone	-2 / -4	15 / 19

Hydrology. Because of the country's hydrological profile, with torrential streams and flood plains, many parts of the country are vulnerable to floods and erosion. Slovenia is rich in water sources, mainly groundwater and springs, which are an important source of drinking-water. There are six main river catchments (Mura, Drava, Sava, So a, Dragonja and Krka). All these rivers, except the last, are transboundary watercourses. Other shared watercourses are the Sotla, Vipava and Kolpa rivers. Slovenia's rivers drain predominantly into the Danube, the others belong to the Adriatic watershed.

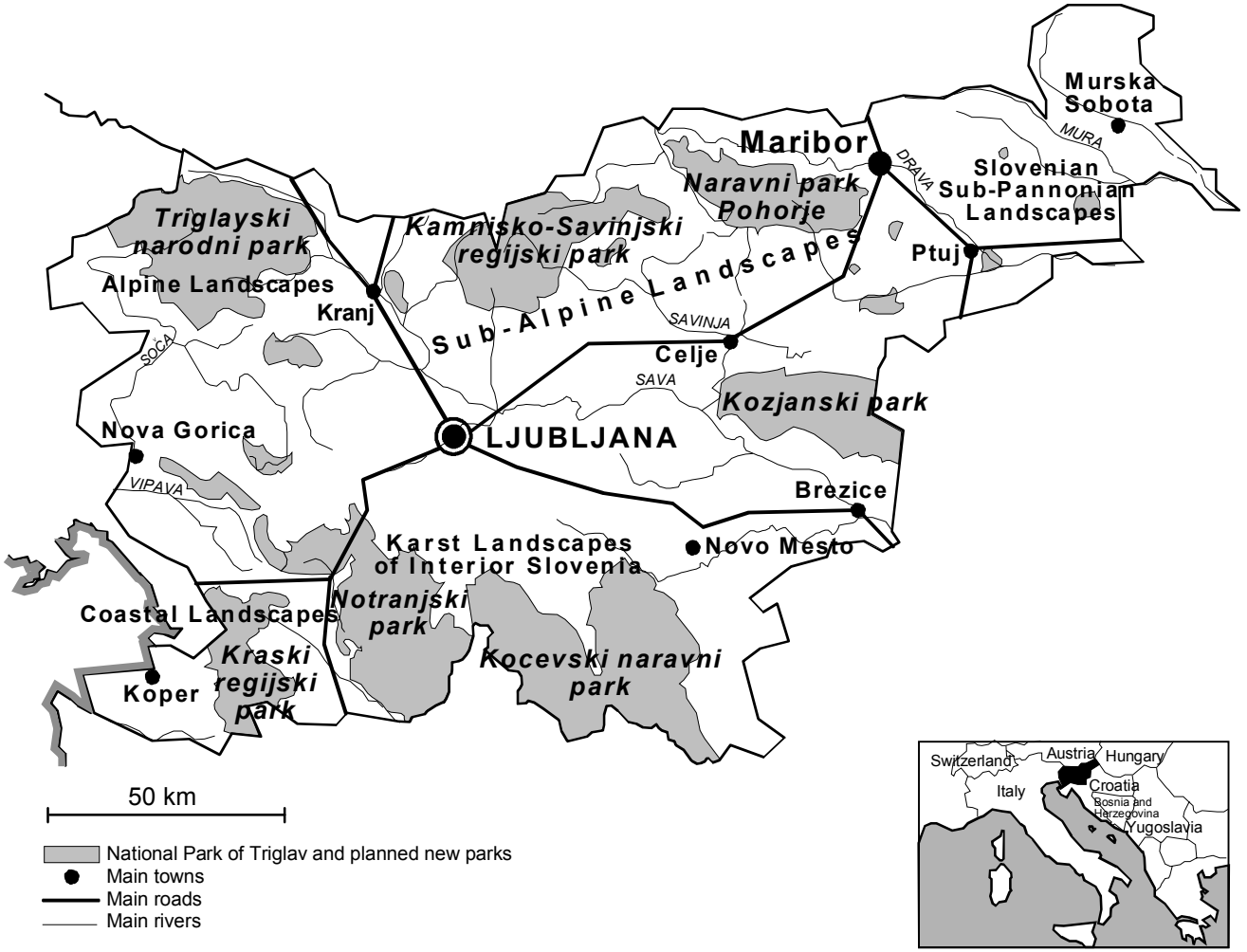
Land use. Forests account for 53% of the country's surface. Natural grasslands, which cover 24.7%, represent around two-thirds of agricultural land use, and arable lands, 12.1%. The main crops are wheat, maize and potatoes. There is also some horticulture and viticulture in the river valleys, mainly in the east and the south. Breeding accounts for half the agricultural output.

Natural resources. Slovenia produces fossil fuels (coal and lignite), some petroleum and natural gas. It also exploits sea salt. Over the period 1990-1993, fossil fuel production decreased, but it still accounts for an important share in energy production. In 1994, 69% of electricity was produced by lignite combustion and 23% by brown coal, which also represented the main input in combined heat and power (CHP) plant production and district heating (chapter 11, figure 11.1). Ore extraction decreased, as did gas and petroleum production. Sea salt extraction, on the contrary, tripled over the period. The mining of uranium, mercury and zinc has stopped completely.

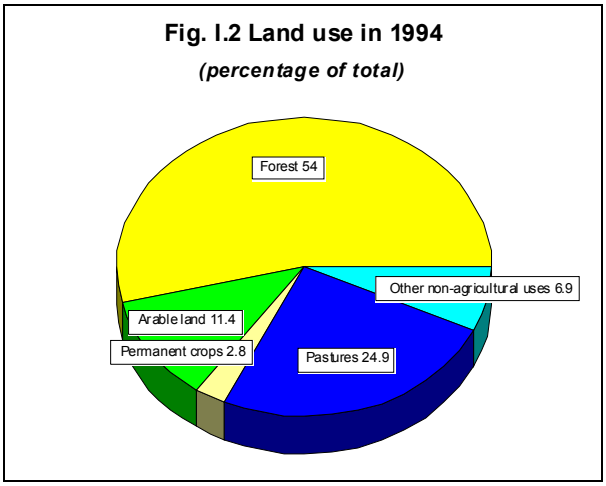
2. Historical and political context

In 1948, the former Yugoslavia severed ties with the USSR and set out to build a new unity. It maintained relations with countries across the political blocs, trading with Eastern as well as with Western countries. Throughout the pre-transition period, people could travel and work abroad, goods could be found which were non- existent in other east European countries and tourism from the West flourished along the Adriatic coast, bringing in hard currency. For its economic organization, Yugoslavia opted for "self-management".

Figure 1.1: Map of Slovenia



Source: Ministry of the Environment and Physical Planning.



Source: Statistical Yearbook 1995, Office of Statistics of the Republic of Slovenia.

A small, homogeneous republic, with its own language, and where most farmers owned their own land, Slovenia embarked on a period of liberalism in the early eighties. Political pluralism emerged very early on in Slovenia, as alternative groups functioned nearly as political parties. Slovenia was the first republic to leave the Federation.

In December 1990, a referendum was held which turned out massively in favour of independence from the Federation. As the situation in Krajina and Eastern Slavonia deteriorated throughout the spring of 1991, Slovenia declared independence on 25 June 1991. A war broke out that was to last ten days. On 25 January 1992, the European Union (EU) formally recognized Slovenia's sovereignty, and a week later it was admitted to the United Nations. As a member of the Council of Europe, Slovenia adopted a policy aimed at European integration. It was not drawn into the general conflict and the war. Political analysts point out that there was no real conflict between Slovenia and the other republics; the real issue being the relationship between Slovenia and the Federation, which was rapidly losing its footing. Also, it has no significant geographically delimited ethnic enclaves, nor does it share historical resentments of ethnic groups within the Federation.

After independence, a new constitution was adopted on 23 December 1991. The Republic of Slovenia opted for parliamentary democracy, delineating executive and legislative powers. Presidential elections are held every five years. At the latest elections in December 1992, President Milan Ku an was elected. The parliament is elected every four years; the latest elections were held in November 1996. The legislative body is a one-chamber parliament (national assembly) with 90 representatives. The National Council of the Republic of Slovenia is established under the Constitution. It represents social, economic, trade, professional, and local interests in the political process. The Council has 40 members, six of whom represent NGOs.

The Constitution guarantees the population the right to self-government and the National Assembly passed a series of laws on the basis of which the reform of local self-government and the national administration was carried out on 1 January 1995. Before, there were 62 municipalities. Now Slovenia has 147 municipalities, of which 11 are city municipalities. The State has transferred part of its responsibilities to 58 administrative units, the centres of former municipalities. A special joint council is elected in each to ensure cooperation between the administrative unit and the municipalities in the area. The goals of Slovenia's local self-government are: (a) guaranteeing the population's right to make decisions on public matters that could be effected through the municipality; (b) increasing the quality of life for people in local communities; (c) distributing administrative responsibilities between the State and the municipalities; (d) rational and efficient local administration; (e) balanced development of all communities; (f) recognizing local self-government as a fundamental element of state organisation, based on the principles of democracy and the decentralization of State power.

There is no regional administration in Slovenia, but the reform of local self-government is continuing and the question of establishing a regional level of government remains open. Individual ministries reorganized their services into 8-12 regional offices, covering the territory of the whole country. In order to promote regional development, there is a need to combine territorial and technological elements through a system of cooperation at the regional level. In general, decentralization is not a major problem in Slovenia, where favourable preconditions existed before transition.

3. Demography

The population stands at around 2 million (1,998,477 at end 1994). Merely 7.6% of the population is agricultural, as opposed to half of the population after the Second World War. However, 48.5% of the population lives in rural communities and villages. Commuting to larger towns is therefore an important aspect of the socio-economic structure. The largest city is Ljubljana (the capital) with a population of 300,000, followed by Maribor (1991 population of

103,000). Net demographic changes are very slight, the population having increased by 0.46% between 1980 and 1990.

Slovenia is an ethnically homogeneous country (87.8% Slovenes, 2.7% Croats, 2.4% Serbs, 1.3% Muslims). Its people are predominantly of Catholic origin. There is an Italian minority, which accounts for 0.2% of the population, and a Hungarian minority (0.4%). Both these communities are recognized as national minorities and are guaranteed special rights under the Constitution. Migration rates were positive (roughly 1:2/emigration-immigration) until 1990, when the war changed migration patterns. In 1991-1992, Slovenia for the first time experienced negative migration rates, due to a sharp increase in emigration, especially in 1991. The situation has stabilized since.

4. Economics

The legacy of self-management sets Slovenia apart among the countries in transition. The system of social ownership, as opposed to State ownership, with the owners of the means of production being the workforce to whom managers were accountable, shaped economic mechanisms, defining liability and accountability and delineating the relationship between the State and the enterprise. In terms of managerial expertise, market practices, technology and experience with western economic partners, the Yugoslav self-management system left behind more favourable preconditions for adjusting to market-based economic development than were found in many countries in transition emerging from tight central planning.

Within the former Yugoslav Federation, the Slovene economy was the most industrialized and advanced of the republics. In the past, all industrial activity in the country was carried out by "socially owned" public enterprises. Privatization started in 1991, on the basis of the creation of a privatization agency, but gained momentum only after December 1992, when the Slovene parliament adopted the appropriate legislative framework.

In its first year of independence, the country went into an economic recession, with falling gross domestic product (GDP) and industrial output, the main reason for this being a decrease in aggregate demand and the disruption of trade flows with other republics of the former Yugoslavia and east European countries. Economic recovery, fuelled by a sharp increase in demand as well as a moderate growth in exports, started in the second half of 1993. Slovenia's GDP per capita is by far the highest in the transition economies (US$ 9,352 in 1995), twice as high as Hungary's, for example, with values closer to low-income countries in the EU, such as Greece and Portugal.

The economic crisis had a different impact on individual sectors of the economy. Manufacturing and construction suffered most, while the service sector managed to pull itself out of the crisis already at the end of 1992. Growth rates for all sectors began to improve again as of 1994. Economic restructuring changed the sectoral distribution of output, with the share of industry in GDP decreasing in favour of services.

A slowdown occurred at the end of 1995 resulting from the combination of a weakening of export markets in the EU and a strong exchange rate, which eroded Slovenia's competitiveness. This slowdown affected almost all manufacturing industries except engineering, which reached a record increase in output of 17.3% in 1995. This sector, especially in machine and transport equipment building, remains an important branch of industrial activity, and a major contributor to exports (31% of total export value in 1995 for SITC section 7 output), followed by the textile industry, wood-processing and the paper industry. Other important industrial sectors are leather and footwear, sportswear, pharmaceuticals and chemicals.

Investment grew by 18.4% in 1995 with the highest rates in financial services and construction. The expectation of higher growth rates at the end of 1996 and in 1997 is primarily based on increases in investments (see table 1.2).

Like the rest of the former Yugoslavia, Slovenia recorded high rates of inflation in the 1970s and 1980s. These rose and remained high until the

Table 1.2: Components of GDP

	1992	1993	1994	1995	1996 Estimate	1997 Forecast	1998-2000 Forecast
	(percentage change from previous period)						
GDP	-5.5	2.8	5.3	4.1	3.1	4.0	4.5
Gross fixed capital formation		8.8	12.2	18.4	13.5	9.0	6.7
Private consumption		13.9	5.1	5.8	3.2	2.9	3.9
Government consumption		5.8	1.6	6.1	0.0	4.5	3.7
Exports		2.1	10.0	5.5	2.8	4.3	5.8
Imports		13.0	5.9	13.5	1.3	4.4	5.9
	1992	**1993**	**1994**	**1995**	**1996**	**1997 Forecast**	**2000 Forecast**
	As % of GDP						
Gross fixed capital formation	18.6	18.8	19.7	21.2	22.1	23.2	23.8
Private consumption	55.1	58.5	56.6	57.9	57.3	56.4	58.8
Government consumption	20.3	21.1	20.2	20.2	20.5	20.7	20.5
Exports	63.1	59.0	60.4	55.3	56.5	-	-
Imports	55.3	57.2	57.6	56.5	56.8	-	-

Table 1.3: Selected economic indicators, 1990-1996

	1990	1991	1992	1993	1994	1995	1996[3]
	(% change from previous year)						
GDP	-4.7	-8.1	-5.4	2.8	5.3	3.9	3.5
Industry[1,2]	-10.5	-11.3	-11.6	-2.5	6.1	4.0	1.6
Services[2]		-6.3	-1.2	1.6	3.5	2.4	4.2
Agriculture [2]		-3.4	-5.9	-3.5	6.4	2.9	3.0
	(in US dollars)						
GDP (mln US$ at current prices)	**17,300**	**12,673**	**12,523**	**12,673**	**14,386**	**18,744**	**18,557**
GDP (bn US$ at current prices and PPPs)	18.4	17.3	17.7	18.4	19.9	21.2	..
GDP per capita (US$)	**8,643**	**6,331**	**6,275**	**6,366**	**7,233**	**9,431**	**9,320**
GDP per capita (US$ at current prices and PPPs)	9,226	8,648	8,868	9,238	10,024	10,725	..

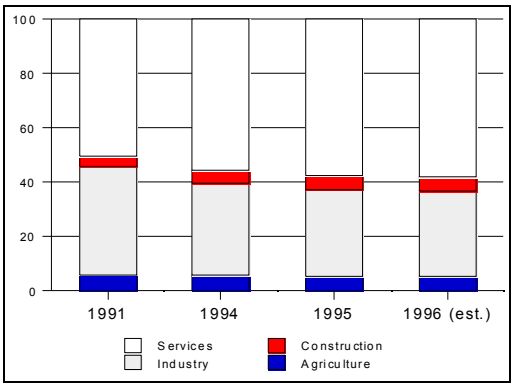
Sources: Banka Slovenije, Annual Report 1994, Ljubljana, May 1995; p.9. Banka Slovenije, Monthly Bulletin (various issues), Ljubljana; Statistical Yearbook of the Republic of Slovenia; and Autumn Report (1996), IMAD.

1 Industrial output: figure for 1990 is from press release of 10 January, 1996 (Industrial Restructuring in Selected Countries in Transition. January 1996, UN/ECE).

2 National Bank of Slovenia uses the following definitions: Industry: Mining, manufacturing, electricity, gas and water supply; Agriculture: Fishing, agriculture, forestry and hunting; Services: Wholesale, retail trade, hotels and restaurants, transport and communications, financial services, real estate, renting and business services, defence, social security, public administration, education, health and social work, other community, construction, social and personal services.

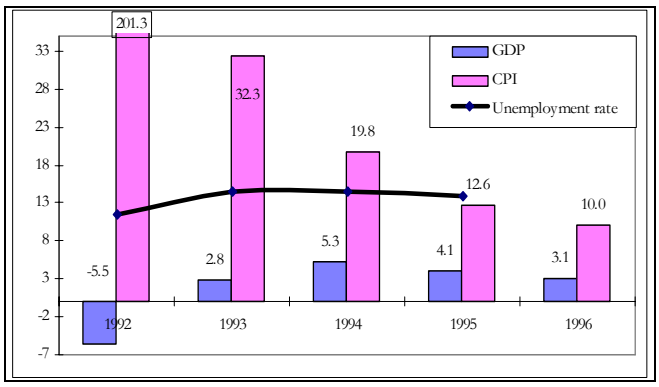
3 Estimated by IMAD (Spring and Autumn Reports, 1996).

Figure I.3: Share of major sectors in GDP, 1991-1995



Source: IMAD, *Autumn Report, 1996.*

Figure I.4: GDP, inflation, and unemployment rates



Source: National Bank of Slovenia.

summer of 1992, when the introduction of the Slovene tolar (Slt) and the adoption of a tight monetary and credit policy by the Bank of Slovenia brought a sharp fall in the monthly inflation rate, with the annual inflation rate reaching single-digit figures in 1995. Foreign trade recovered in 1993, when exports successfully redirected from the former Yugoslav toward western markets and the export of services began to grow. In comparison with 1992, import trends changed significantly, with a 34.5% increase in the import of consumer goods. A balance-of-trade surplus of US$ 49.5 million in 1992 was followed by a US$ 154 million deficit in 1993. The balance of trade deterioration was due to a rapid growth in imports of capital goods and intermediate goods.

The current account balance for 1995 turned out to be the worst since 1991, revealing a deficit of US$ 36.4 million (0.2% of GDP). Import growth should slow as a result of the depreciation of the currency in the latter part of 1995, but is still likely to exceed export growth in 1996, leading to a further widening of the trade deficit. The growth of expenditures on goods and services resulted in Slovenia's foreign currency holdings falling short of three months' imports in 1995.

A trade and cooperation agreement signed in April 1993 improved Slovenia's access to the EU markets. The EU has in the last years confirmed its position as Slovenia's leading trade partner. Although the total trade volume with the EU marginally declined in 1995, the Union still accounted for 67% of all exports. The main exports are manufactured goods, electrical appliances, transport equipment, machinery, chemicals, metal goods, furniture and other wood products. In addition, 68.5% of all imports came from the EU. Slovenia's main trading partners are Germany, Italy, France, and Austria. An interim agreement made the trade provisions of the associative agreement signed between the EU and Slovenia in June 1995 operative before ratification of the associative agreement. Bilateral free-trade agreements have enabled the country to intensify trade relations with other central European countries in transition (Czech Republic, Hungary, Poland and Slovakia), and it became a member of the Central European Free Trade Agreement (CEFTA) on 1 January 1996 (table 1.4).

5. Human development

Slovenia's human profile is similar to that of all industrial countries, marked by increasing life expectancy, low fertility rates and a progressive ageing of the population. Male life expectancy increased by 2.9 years over the period 1980-1995, up to 70.3, and by 2.6 years for women, reaching 77.8 in 1995. These figures are slightly lower than in the EU, but rank Slovenia high among the countries in transition. With a fertility rate of 1.32 in 1994, Slovenia lies in the lower middle range of EU countries.

Lower birth rates and increasing life expectancy are contributing factors to an ageing population. In 1991, 23% of the population was under 15, 65.7% was aged 15-65 and 11.3% was over 65. In 1993, 19% of the population was under 15, 69.1% was aged 15-65 and 11.7% was over 65. The retirement age is relatively low in Slovenia (56 years for women and 61 for men). There are plans to raise the retirement age to 63 for men and 58 for women in 1997. Estimates for 1993, on the assumption of an economically active population aged 18-60 for men and 18-55 for women, indicate a dependency ratio of 75:100 for children and pensioners.

Health and living conditions are similar to those in the EU, with European averages for medical coverage for most indicators (e.g. 578 hospital beds per 100,000. inh. in 1993) and housing standards (20-40

m^2 floor space per capita). As concerns educational achievement, Slovenia has an educated, skilled workforce. Gross combined enrolment ratios at first and second level are over 90% and third-level ratios are 20:1000. In spite of the economic recession, real public expenditures on health and education have not significantly decreased; after falling more than GDP in the period 1990-1991, public health funds grew faster than GDP in 1992-1993 (7.3% in 1993), and since then have modestly declined by one decimal a year, with an estimate of 6.9% for 1996.

Statistical coverage of employment is very comprehensive in Slovenia. Unemployment - as a result of economic adjustment - has been quite high in the last few years (>14%). Employment in the private sector and self-employment have risen in the past years, gradually offsetting declines in the public labour market. The share of services in employment has increased, reflecting sectoral changes. Unemployment benefits are payable for a duration of 3-24 months, according to the duration of previous employment, with a coverage of 70% of previous earnings in the first 3 months and 60% for the rest of the period. In 1995, however, only 22% of the unemployed were receiving benefits, which implies not only a tightening of eligibility criteria but suggests unemployment structures with a high percentage of first-time unemployed who have not contributed long enough, as well as long-term unemployed who have exceeded the duration and lost their entitlements.

Table 1.4: Main economic indicators, CEFTA, 1995

	GDP [1] (% over 1994)	Gross industrial[1] output (% 1994)	Total labour[2] productivity (% 1994)	Unemployment rate [2](est.)	CPI [2] (% Dec.-Dec.)	Trade balance (billion US$)
Slovenia[3]	3.9	2.0	5.2	13.9	8.5	-1.176
Czech Republic	4.8	9.2	1.9	2.9	8	-3.853
Hungary	1.5	4.8	2.9	10.4	28.5	-2.605
Poland	7	9.4	6.3	14.9	22	-6.157
Slovakia	7.4	8.3	5.2	13.1	7.4	-0.621

Sources: 1 Project LINK World Output, October 1996 and WIIW October 1996, in *Slovenian Economic Mirror, 11/96;*
2 UNECE, *Economic Survey of Europe, 1995-1996;*
3 Data for Slovenia: Bank of Slovenia, Monthly Bulletin (January 1997); for other countries, UNECE, *Economic Survey of Europe, 1995-1996.*

6. Environmental context before 1990

Slovenia has long taken a keen interest in its environment. In the late seventies, when Slovenia was a republic within the former Yugoslavia, the first official administrative body was established to tackle environmental problems. The first environmental legal acts issued at that time were very sector-oriented. Public participation in the environmental decision-making process was negligible. The gradual environmental deterioration in the eighties posed serious threats to human health and to development. As awareness among the public at large increased, stronger NGOs started to play a significant role in 1986-87. At that time the basic environmental national priorities were defined and the environment fund set up. Some major environmental decisions were taken, such as the switch to less polluting fuels to curb air pollution.

PART ONE: THE FRAMEWORK FOR ENVIRONMENTAL POLICY AND MANAGEMENT

Chapter 1

LEGAL INSTRUMENTS AND INSTITUTIONAL ARRANGEMENTS

1.1 Environmental legislation, enforcement and compliance

Legislation

The development, adoption and enforcement of a new, post-independence Slovene legal system have not yet been completed. During the transitional phase, all previous laws remain in force, provided that they do not conflict with the emerging new system. It is expected that a number of environmental legal instruments will, therefore, continue to remain applicable for some time. In developing its new environmental legislation, Slovenia is paying special attention to its harmonization with European Union legislation.

The Environmental Protection Act (EPA) of 1993 is the fundamental law for environmental policy and management. It constitutes the first comprehensive collection of aims, principles and rules of environmental management since independence. EPA is based on Agenda 21, environment-related EU directives, and Slovene experience with environmental management.

EPA is the basis for the preparation of other legal instruments. Regulations, directives and standards are to be prepared by different levels of government, depending on the legal instrument in question. Several institutions are entitled to initiate a legislative procedure. The procedure is systematically supervised by the Governmental Service for Legislation. Subject-matter experts can be - and regularly are - involved at various stages of the process. Coordination between different ministries is informal during the preparatory phase of a legal instrument. At Cabinet level, formal coordination takes place in at least one of three standing Governmental Committees, of which the Economic Committee includes the Minister of Environment and Physical Planning.

The National Council of the Republic of Slovenia has an accommodating legislative process. The Council can, *inter alia*, propose legislation to the National Assembly, cause the Assembly to reconsider statutes prior to their proclamation by the President, call a referendum, and call for the establishment of a parliamentary inquiry into a matter of public importance. Parliamentary committees may - but are not obliged to - hold public hearings and may allow interested associations and individuals to assist in drafting bills.

The Parliamentary Committee of Infrastructure and Environment deals with the environment-related legal instruments. Parliamentary committees cannot take initiatives on their own. Legal instruments of the highest level, i.e. acts, are published and distributed in draft form to the public in the ‘Parliamentary News’ prior to their discussion - first, second and third reading - in Parliament.

In recent years legal instruments of various kinds (laws, regulations, directives, ordinances, etc.) pertaining to the environment have been adopted and several are waiting to be brought before the National Council for discussion. They relate to general questions of environmental policy and management, as well as to the protection of environmental media and other specific issues.

Compliance with EU provisions

Since independence, Slovenia has taken steps to develop the economic conditions necessary for EU membership. Today Slovenia’s GDP per capita is still below the EU average, although a comparative analysis places it on a par with Greece and Portugal. On 10 June 1996, Slovenia signed an agreement of association with the EU and its member States. It contains provisions which will strongly affect environmental protection in Slovenia.

Slovenia will have to comply with EU standards and western environmental attitudes, which are in some cases stricter than those currently applied in the country. Despite differences in legislative structure, the Slovene approach is compatible with the EU legislation. However, the cost of joining EU and adjusting to EU environmental legislation in particular will put a significant economic burden on the country, even if this burden has so far been assessed only roughly.

In 1995, the Regional Environmental Center for Central and Eastern Europe (REC) made a comprehensive assessment of the compliance level in central and eastern European countries with EU environmental legislation. It estimated compliance rates of the national legislation in individual countries with the respective EU provisions. Regarding Slovenia, it indicated that more efforts are to be focused on practically all areas of environmental protection, in particular waste, chemicals, industrial risks, biotechnology and water. The future development of transport infrastructure (see chapter 12) and the restructuring of agriculture (see chapter 10) can be expected to create further requirements in connection with the EU accession. Since then, Slovenia has adopted several regulations on air, water and soil which are in line with the EU legislation. A pre-accession programme for EU membership has been worked out.

1.2 Environmental administration and coordination

Structure of the Ministry

The Ministry of Environment and Physical Planning has been reorganized several times during recent years. Initially focused on water, its activities were extended to all environmental media, then in 1991 to spatial planning, and in 1995 to nature protection. Between 1991 and 1995, the number of staff - including those in all associated institutes - grew from around 300 to nearly 1200. Further strengthening as well as training of MoEPP staff are foreseen in 1997.

The current organizational structure of the MoEPP was established in December 1994. It is included in figure 1.1. The major specific tasks of its institutes are described in figure 1.2.

Levels of administration

The national and the local level (147 municipalities) are the two formally established levels of administration. There is no regional level in the country's structure of public administration. However, there are 58 regional administrative units, linking national ministries and local administrative bodies. They perform local administrative tasks. A special Joint Council is elected to ensure cooperation between the regional units of the MoEPP and local communities. In addition, the Nature Protection Authority deals with various environmental issues. Its Water Management Department has eight subdivisions, one per major watershed. Its Nature Protection Department has seven regional offices, which function as technical supervisory bodies for the local level. The Inspectorate for Environment and Physical Planning is organized in several regional subdivisions of similar legal status: nine offices for environmental inspection and twelve for the inspection of physical planning.

The functions of local administration in the field of environment are:

- To regulate and maintain water and power supply facilities;
- To protect the air, soil and water resources;
- To protect against noise and provide for the collection and disposal of waste;
- In urban municipalities, to provide for the preservation of natural and cultural monuments of local interest.

Municipalities may join in regional associations to regulate and pursue local matters of wider interest. This provision is particularly relevant for environmental protection necessitating equipment of regional capacity, like waste removal and treatment, or waste-water treatment facilities. On the other hand, there are also developments leading to an increase in the current number of 147 municipalities.

Governmental coordination

The mandate of the Ministry of Environment and Physical Planning is laid down in the Act on the Organization and Terms of Reference of the Ministries. The Act stipulates that the preparation and implementation of the policy, regulations and measures and the supervision of environmental protection at large are under the jurisdiction of

MoEPP and its associated organizations. However, no formal prescriptions are made for interministerial coordination. As a result, such coordinating efforts are generally carried out on an ad hoc basis, depending on personal initiative.

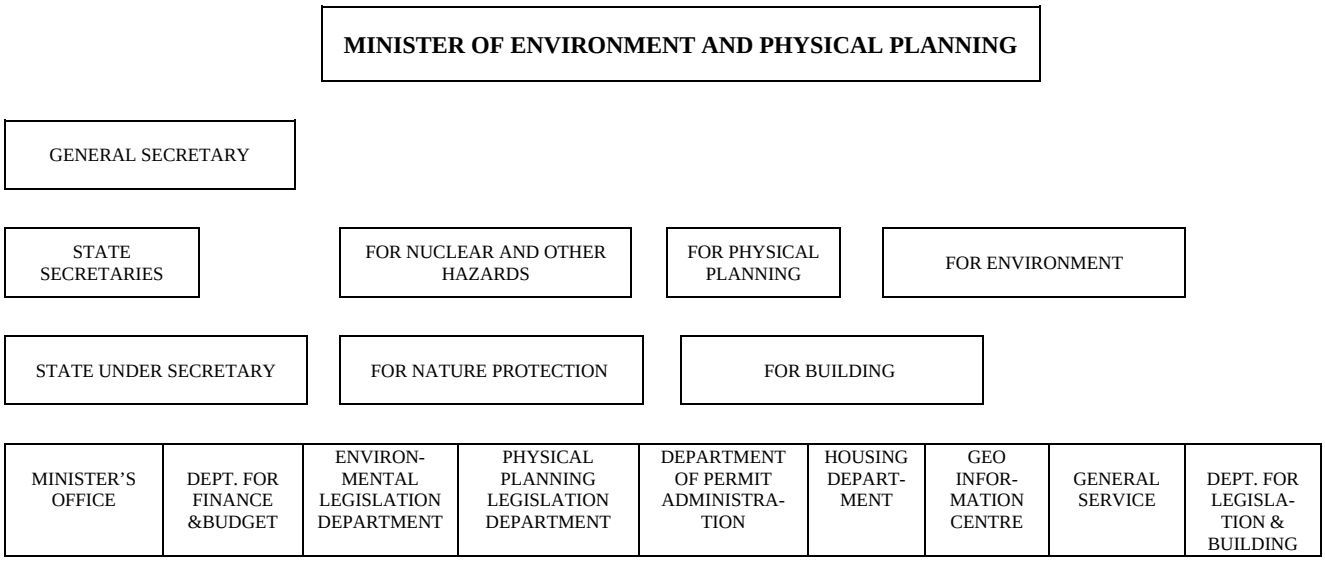
On occasion, formal ministerial arrangements are made to specify cooperation on issues of common concern. For example, an agreement has been signed between the MoEPP and the Ministry of Science and Technology on scientific research in environmental protection over a ten-year period. An Interministerial Working Group, including eight ministries, harmonizes new legislation with EU directives on hazardous chemicals (risk evaluation of health and environmental hazards, classification, packaging, labelling, transport, measures, export/import, restrictions on marketing).

The MoEPP considers that the tasks indicated in the box below require interministerial cooperation:

Ministry/office	**Relation***	**Topic**
Labour, Family and Social Affairs	O	Demography, social care
Economic Relations and Development *Off. for Macroeconomic Analysis and Development* *Office for Privatization*	f	Financial issues
Finance	F	System of taxes, charges, public income/expenditure
Economic Affairs *Agency for Efficient Energy Use* *Inspectorate for Energy*	F	Strategy for industry, energy, tourism
Agriculture, Forestry and Food *Inspectorate for Agriculture, Forest, Hunting, Fishing*	F	Sustainable development of forest ecosystems, development of agriculture, development of rural areas
Culture *Authority for Cultural Heritage* *Inspectorate for Cultural Heritage*	O	Protection of cultural heritage
Internal Affairs	F	Control of implementation of regulations on administrative procedures, education on administrative procedures
Defence *Office for Rescue and Protection*	F	Environmental and other disasters (industry, chemicals)
Justice	F	Legislation, violations of laws
Transport and Communication *Authorities (marine, aerial)* *Directorate for Roads* *Inspectorate for Roads*	F	Policy on transport, EIA
Education and Sport	O	National curriculum (education in environmental issues)
Health *Inspectorate for Health Protection*	F	Drinking-water quality
Science and Technology *Office for Standardization*	O	Research programme
Foreign Affairs *Office for European Affairs*	F	Harmonization of legislation and enforcement
Statistical Office of the Republic of Slovenia	F	Statistical issues

* Relation: o: occasional; f: frequent

Figure 1.1: Structure of the Ministry of Environment and Physical Planning



An investigation into the environmental contents of national programmes and strategies was conducted in 1995. Environmental facts, targets and directives turned out to be relatively well presented, but policy instruments and measures, the time frame for activities and the actors concerned were not well presented.

Cooperation with the business sector

The Chamber of Economy (chamber of commerce*)* represents the interests of industry through its different organizations. Its network plays a role in disseminating information and exchanging experience between enterprises. Within the framework of the Chamber, the Chamber of Environmental Protection Operators was set up as an association of the physical and legal persons that carry out environmental protection activities. Its goal is to improve environmental performance in industry. The Association of Environmental Business has been organized to promote a market for industries producing environmentally friendly goods and services.

The representatives of the Chamber participated in the preparation of the National Environmental Protection Programme (NEAP). The Department for Waste Management of the Chamber was consulted by the MoEPP in the preparation of emission standards. It has conducted projects on phasing out ozone-depleting substances, on the Montreal Convention Fund, on environmental management courses and on the Waste Exchange (chapter 9).

Some enterprises within the business community are internationally oriented. This group favours a rapid introduction and enforcement of European environmental standards. Its interest appears to be primarily motivated by the need to replace the traditional export markets by the European market. This aspiration goes hand in hand with a wish to align production on single sets of environmental standards, thereby avoiding or reducing production cost differentials between competitors in the national market. Evidence of voluntary agreements between industry and government did not become available during the EPR mission.

1.3 Policy objectives, priorities and non-financial instruments

Objectives

Article 3 of the Environmental Protection Act sets out the aims of environmental protection:

(1) Fundamental objectives:

1. The continuing preservation of the vitality of nature, biological diversity, endemic biological species, and ecological balance.
2. Preservation of the diversity and quality of natural resources, natural genetic stocks, and productive soil.

Figure 1.2: Main functions of the institutes of the Ministry of Environment and Physical Planning

INSTITUTES OF THE MINISTRY

NATURE PROTECTION AUTHORITY	GEOPHYSICS ADMINISTRATION	OFFICE FOR PHYSICAL PLANNING	SURVEYING AND MAPPING AUTHORITY	NUCLEAR SAFETY ADMINISTRATION	INSPECTORATE FOR ENVIRONMENT AND PHYSICAL PLANNING	HYDRO-METEOROLOGICAL INSTITUTE
• natural resources • environmental protection (air, water, soil) • general protection of natural flora and fauna • handling of waste • assessment of effects • public services of protection • funding of measures • information systems • technical work for Eco-Fund • water management • elimination of consequences of natural and other disasters.	• station network of seismological and other geophysical phenomena • safety, protection and early warning regarding earthquakes • earthquake-safe buildings and facilities • public information service and forecasts.	• land use and management, urban and regional development • supervision of the preparation of land use plans by local authorities and physical information system.	• standards for topography, borders and buildings • standards for measurement of cartographic and land use information • standards enabling linkage of survey data and administrative records • administrative and technical matters of the basic survey system • state map and different registers of facilities • public information from geodetic and other records.	• safety of buildings of nuclear installations • traffic, transport and handling of radiological materials • supervision and inventory of nuclear materials • nuclear damage • training of staff in buildings of nuclear installations • quality assurance of staff • radiological monitoring • public information services during and after accidents • international cooperation • supervision of the implementation of legal instruments	• supervision of the implementation of legal instruments • ecological control on the state border • supervision of the water regime, water development and management • supervision of the activities of physical planning • supervision of the housing development survey activities.	• network of meteoroloical, hydrological, agricultural and ecological stations • measurement of meteorological, hydrological and agrometeorological features • air and water pollution records • meteorological, hydrological and environmental analysis • short-term and medium - term weather forecast • forecast of the influence of meteorological parameters on farming cultures • cooperation in navigation protection, road and airborne traffic • warning of hydrometeorological disasters and radar meteorology • hail protection.

3. Preservation and restoration of the diversity and the cultural and aesthetic value of landscape and other non-expendable natural resources.
4. Reduced and optimized consumption of natural resources, materials and energy.

(2) Operational objectives:

1. Gradual transition to the use of renewable natural resources.
2. Prevention of threats to the environment and reduction of environmental stress.
3. Remedy of environmental damage and re-establishment of the regenerative capacity of the environment.

(3) Additional objectives to ensure a development that preserves the environment:

1. Changes in production and consumption patterns to minimize the consumption of natural resources and the production of waste.
2. Development and application of technologies that reduce or avoid environmental stress.
3. Promotion of harmless or non-stable chemicals and of non-bioaccumulating substances.

Priorities

The EPA stipulates that the NEAP is to set out the goals, guidelines and strategy for environmental protection and the use of natural resources for the next 10 years, subdivided into two five-year periods. The first period is devoted to the preservation of nature and of the quality of natural resources as well as the reduction of impacts of human activities. The focus during the second period will be on the implementation of sound environmental technologies.

NEAP should in particular cover: (i) environmental stress and its impact on the health of the population; (ii) the assessment of the state of the environment, of individual natural resources, and of the risks to which they are exposed; (iii) long-term projections of environmental trends and conditions; (iv) attainable goals and methods for their realization; (v) necessary financial means; (vi) priority tasks and projects; (vii) analysis of expected costs and benefits; and (viii) guidelines for the technical development of environmental protection activities and public services. The NEAP should be divided into global, national, regional and local concerns. The first complete NEAP draft was due in November 1996. At the time of writing, it was expected that the NEAP would not be adopted before the end of 1997. The NEAP can be expected to include short-, medium- and long-term environmental policy targets, together with a list of the perceived basic problems in the country. The NEAP also draws attention to conditions which are essential for its implementation, including an estimate of the cost of its implementation (about 1.5% of GDP annually).

Permits and environmental impact assessment (EIA)

In Slovenia three permits are necessary to carry out a new project, all to be issued by the MoEPP: a location permit, a building permit and an operation permit. For those projects for which EIA is mandatory, the EIA has to be completed before a location permit can be delivered. The scope of the EIA is determined by the Nature Protection Authority according to the characteristics of each project.

The location and building permits take both the environmental and the public aspects of a project into account. The Nature Protection Authority specifies the environmental aspects in the operation permit. The building process and the operation of the facility are controlled by the Inspectorate for Environment and Physical Planning and other competent inspectorates.

In 1993, the EPA prescribed the introduction of EIA. The full implementation of the EIA process came into force at the end of 1996 and the regulations on the methodology of the environmental impact report and on the conditions and procedure for obtaining the authorization for preparing EIA (both approved in November 1996). The EIA process could thus be fully enforced in 1997. Figure 1.3 schematically presents the procedure for obtaining the three permits, including the EIA procedure. In the past, such assessments were not compulsory by law, but could be - and sometimes were - undertaken if the operator of the activity in question so decided.

1.4 Environmental information

Provisions

The EPA stipulates public access to environmental information at a price not exceeding its actual cost.

Local authorities are entitled to obtain, and, upon request, bound to provide information on environmental stress produced by any business operation.

Monitoring and other data

The EPA requires environmental monitoring and the operation and maintenance of an environmental information system. Monitoring of natural phenomena and immission is the duty of the MoEPP. Emission monitoring has to be done by the polluters. The environmental information system is a basis for the preparation of reports on the environmental situation, which are to be submitted by the Government to the National Assembly for discussion and adoption at least once a year.

The Nature Protection Authority is to establish the basis for the environmental protection information system. It is also responsible for the operation and maintenance of the system. Fulfilling this task requires the development of special regulations. The regulations referring to emission monitoring of certain air and water polluting substances are in force.

Dissemination

The following major tools are used for public information on the environment:

- A 'Service for Public Relations' was established in MoEPP. It issues a monhtly bulletin "Environment and Planning" in English and Slovene and broadly disseminates it. An information centre will become operational in a year's time.

- The Statistical Yearbook contains selected environmental data. The Statistical Office runs a publicly accessible Information Centre in Ljubljana. The establishment of further centres in other towns is planned.

- The National Environmental Report is prepared by the MoEPP and adopted by the National Assembly every year. The first volume was published in Slovene (600 copies) and English (800 copies) in 1996 and widely publicized. The Hydrometeorological Institute also issues separate reports on water and air quality every year.

1.5 Public participation

Provisions

The rights and prerogatives of the public in environmentally relevant issues are set out in a number of laws and other legal instruments. The Constitution of the Republic of Slovenia (adopted in June 1991) states the right of citizens to a healthy environment. Public participation in the EIA process is specified in the EPA with regard to procedural questions (public presentation of the draft decision, participation in discussion, public hearings, announcement of final decision). The law also stipulates that a person has the right to take part in a decision on granting a licence for an activity, if the activity would encroach upon the right to a healthy environment.

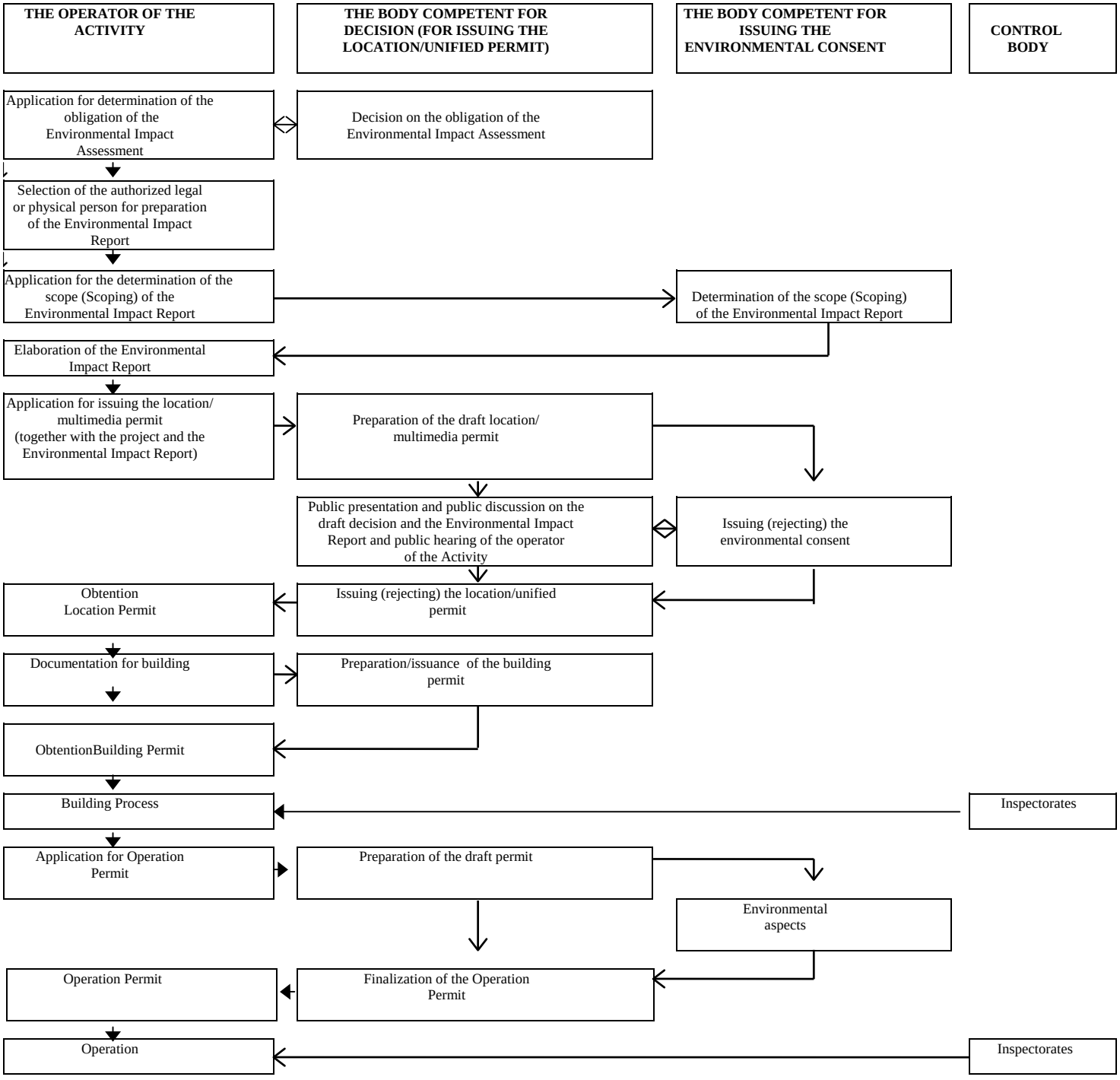
The EPA also specifies the entitlement to the so-called "popular suit". Citizens as individuals, societies, associations or organizations may file a suit, demanding the termination of an action interfering with the environment, if such action represents or would represent a direct threat, critical stress, or damage to the environment, or direct threats to human life or health.

The governmental legislative process includes a consultation wherein interested governmental authorities have the opportunity to comment on draft laws. Institutions, such as scientific academies, university faculties and governmental institutes, are generally asked to review draft laws. Occasionally, this process is extended to individuals or non-governmental organizations (NGOs).

Non-governmental organizations

NGO activities range from environmental education, promotion of sustainable agriculture and nature conservation to environmental management and energy efficiency. To set up a non-governmental organization it must be registered with the municipality or the Court and the Statistical Office. NGOs are non-profit organizations, and are exempt from paying taxes. Their running costs are in principle financed by membership fees or by donations for specific projects.

Figure 1. 3: SYSTEM OF PERMITS INCLUDING EIA PROCEDURE



About 50-60 NGOs are primarily devoted to environmental issues. The NGOs of national importance are: the Natural History Society of Slovenia, with the longest tradition in nature conservation; the Union of the Societies for Environmental Protection, founded in 1971; the Slovene Ecological Movement, founded in 1992, publisher of the quarterly magazine 'Environment'; and the Slovene Ornithological Society. Most of the other core environmental organizations operate locally.

On the basis of EPA provisions, the Council for Environmental Protection, a body of researchers and scientists, was established by the Slovene Parliament in 1993. The Council provides descriptions of environmental conditions and analyses special topics, like the National Highway Network Construction Programme, waste disposal and waste treatment problems, or the Strategy for the Effective Use and Supply of Energy. In 1996, the first volume of 'New Circumstances and Horizons' was issued: 'Views on Nature and Environmental Protection in Slovenia'. It is being widely distributed. A second volume on chemicals and the environment is scheduled for publication in 1997.

The activities of NGOs can broadly be characterized by the following actions and results:

- Organizing educational and training programmes, nature protection actions, ecological summer camps, ecological campaigns. In larger cities, there are campaigns to collect bulky waste free of charge.

- Participating in environmental policy-making.

- Participation in all major international meetings since the United Nations Conference on Environment and Development in Rio de Janeiro. On occasion, alternative meetings have been held by NGOs simultaneously with governmental conferences.

- An organized process of cooperation between non-governmental organizations began in October 1994. It was decided that NGOs should forego an umbrella organization in favour of a flexible network based on common interests and projects. Thus, a majority of NGOs are now endeavouring to work together on the most important issues which are crucial for their effective participation in environmental policy-making.

- In 1995, NGOs published an Agenda 21 for Slovenia.

- In 1996, NGOs campaigned against the excessive use of pesticides and, with the support of the media, they succeeded in persuading the Government to change its policy on the control of pesticides. Other campaigns were also organized.

Here are some examples of cooperation between NGOs and governmental or scientific institutions:

- MoEPP invited the representatives of the NGO, business and science communities to a workshop on environmental priorities during the preparation of the National Environmental Protection Programme.

- The Council for Research and Protection of the Environment is a consultative interdisciplinary scientific body under the auspices of the Academy of Sciences and Arts. This Council holds public lectures and meetings on environmental problems, and publishes scientific papers (Environment and development-1988; The Environment in Slovenia-1994; The pervasiveness of chemicals in the environment and life- where is the limit?-1997).

- The MoEPP financially supports NGO projects on the basis of a yearly tender, called "Promotion of environmental issues". The budget available for NGOs is, however, rather limited. The NGOs' main sources of funds are the REC, a few international organizations and also donations from business.

1.6 Environmental research and development, cooperation with the academic community

The EPA made environmental protection a mandatory chapter in the National Research Programme (NRP). The MoEPP contributes to its preparation and takes part in decision-making.

Environmental R&D in Slovenia is financed as follows:

- The fundamental research projects according to the EU Fourth European Action Programme are financed by the Ministry of Science and Technology;
- The applied research projects are co-sponsored by the Ministry of Science and Technology and other ministries (MoEPP, Ministry of Internal Affairs for toxic materials, Ministry of Health, Ministry of

Agriculture, Ministry of Defence for floods) and, occasionally, industry;

- The goal-oriented research programme is co-financed by the Ministry of Science and Technology and MoEPP;
- Special studies (background studies for new legal instruments, collection and analysis of data, emission limit values) are financed by the MoEPP;
- Research projects can be carried out with the help of foreign contributions (participation in bilateral, multilateral, international programmes: COST, TEMPUS, ERASMUS, etc.).

In 1992 and 1993 MoEPP and the Ministry of Science and Technology co-financed the following R&D programmes:

- Atmosphere and global changes;
- Water pollution, soil and groundwater protection;
- Waste management and technology for protecting the environment;
- Effects of damaging events on humans and other organisms;
- Social viewpoint of the environment;
- Preserving the cultural and natural countryside.

In 1992 MoEPP allocated 3.85% of its total funds to the NRP. The percentage dropped to 2.47% (101,179,169 tolars) in 1993. The environment-related programmes in chemistry, biology, construction, siting studies, biotechnology and medicine are not covered by this figure.

In 1994, a goal-oriented research programme was started focusing on the following themes:

- Atmospheric processes and the quality of the air;
- Quality of surface and underground waters;
- Quality of freshwater and sea water;
- Waste management.

In 1994 and 1995 these projects were financed by the MoEPP and the Ministry of Science and Technology. The budgets amounted to 12,600,000 and 18,900,000 tolars respectively.

The institute for environmental protection of Slovenia foreseen by the EPA has not been established. The question under discussion continues to be whether to establish a new institution, or to entrust the tasks concerned to existing research groups and institutes.

There are a number of independent and semi-independent scientific institutes: the Water Management Institute, the Josef Stefan Institute, the National Chemical Institute, the International Centre for Chemical Studies and universities which can contribute their scientific expertise to the development of environmental management.

1.7 Environmental education and training

Education in kindergartens, elementary and secondary schools is the responsibility of the Ministry of Education and Sport. Graduate and postgraduate education are in the hands of the independent universities. A new Law on Education was adopted in 1996. According to this law, different bodies of experts were established in 1996 to draw up a new national curriculum. The National Curriculum Council and commissions deal with specific fields of education and subjects. One of these bodies is the Cross-Curriculum Commission on Environmental Education. An integrated national strategy for environmental education does not exist.

Slovenia has joined the European programme “Eco Schools”. The programme is supported by the Ministry of Education and Sport and aims at involving pupils in elementary schools, their teachers and parents in a predetermined environmental activity every year. Other initiatives, e.g. a pilot education programme in Nova Gorica, training courses for school teachers with the support of board of education and NGOs, and relevant PHARE programmes have also begun. Common activities have also started with the co-financing of the British Council.

Environmental engineers are trained at Maribor University and in Nova Gorica (Faculty of Environment). At Ljubljana University, Biotechnical Faculty, bachelors of science can graduate in microbiology, landscape architecture, agronomy, animal sciences, food technology, forestry, wood technology and biology; in the Faculty of Philosophy, students can graduate in geography; and in the Faculty for Building and Geodesy, students can graduate in sanitation and hydrotechnology. In addition, postgraduate programmes exist in sociology, economics, law, global impacts, water management, waste-water treatment, natural ecosystems, environmentally sound technologies, and there are two interdisciplinary programmes.

1.8 Conclusions and recommendations

Conclusions

The development of a national legal system for environmental protection after independence has made steady progress. The benchmarks from which its substantive provisions are being developed combine relevant antecedents with the need to respond to major environmental challenges as well as international obligations. At present, the development of all the legal instruments necessary for the full implementation of the provisions of the laws appears to be one of the two major tasks ahead. The second is the increased attention that ought to be given to enforcement. Current work on a programme for the remaining legislative tasks should help to avoid unnecessary delays in the implementation of all legal instruments. The swift application of the full scope of EIA procedures ought to be a particular priority in this connection.

The scope of activities of the MoEPP appears to be almost optimal after the last restructuring. The need to develop both the volume and the qualification of ministerial staff in a way commensurate with the tasks is well understood. The outstanding task for further improvement appears to be the coordination and cooperation across administrative and related geographical boundaries. Coordination with other departments or ministries is necessary for the incorporation of strategic environmental objectives - like sustainable development - into departmental policy programmes and actions. In particular, the quality of the full implementation of EPA provisions, of the EIA process, and of the development of the NEAP (as well as other broad programmes and action plans) depends to a large extent on inter-ministerial coordination and cooperation. Interdepartmental coordination is also indispensable for an effective harmonization of management principles and actions in various fields. The MoEPP should be endowed with a sufficiently staffed administrative branch, whose sole responsibility would be coordination. Parallel units in other departments or ministries would be very helpful. Such a unit appears to be a special priority in the Ministry of Economic Affairs.

Cooperation between the public authorities and industry seems to be developing slowly. It would be to the advantage of all public and private actors, if the conceptual framework for cooperation were more actively developed. Here again, better coordination, in particular between the ministries involved in economic decision-making and the MoEPP, would be most valuable.

Problems remain in the organization of governmental administration. While the constitutional importance afforded to self-government is particularly beneficial for environmental management, the absence of a regional administration creates a stumbling block. The negative effects are most felt in projects that necessitate cooperation between municipal authorities and with the State administration. As a result of this gap, different forms of cooperation and coordination are developing on an ad hoc basis, always carrying the risk of becoming mutually incompatible.

The ‘constitutional strength’ of local administrations can only be welcomed. However, the efficiency of environmental management at the local level does not yet seem optimized. If improvements are to be made, local authorities should have budgetary means commensurate with their tasks, and local administrations should acquire expertise in environmental matters. Cooperation between the MoEPP and local administrations is particularly necessary during the build-up of local capacities.

While the full-fledged implementation of the EIA procedures appears to be imminent, the delays in the development of the NEAP are regrettable. The conclusion of the NEAP should be seen as a top priority, because the proper incorporation of environmental objectives into strategic policy programmes in various fields (transport, agriculture) appears to have been delayed by its absence.

The recent completion of an integrated permitting system, complemented by the EIA procedure, clarified the conceptual development of non-financial instruments. The scheme now in place stands a good chance of success, if the persisting problems with enforcement, including the application of legal sanctions in cases of violation of rules, can be solved. However, several of the problems raised above (governmental coordination, training of local staff in environmental issues, programme clarification, as well as cooperation with industry and other non-governmental institutions) could hamper its smooth functioning, if not solved.

Of particular concern in this context is the staffing of the Inspectorate. While the definition of its tasks corresponds well to the legal requirements, the number and qualification of its staff fall clearly short of the minimum requirements. As a result, inspections occur too rarely both in large units and in the growing number of small enterprises.

The availability of environmental data is unsatisfactory. The creation of an adequate information system will have to solve two problems. Firstly, a large number of sources of information need to be coordinated. Secondly, an approach ought to be chosen that makes it possible to harmonize the compilation of data at the international level. To achieve both objectives, a national lead agency should be designated. It would help the creation of the information system from the conceptual and organizational point of view. The lead agency should have its own international contacts to benefit from as wide an experience as possible in its professional work.

The effects of public participation in environmental management and policy-setting are difficult to assess. On the one hand, legal provisions exist for such participation. On the other, it is not always clear to which extent they are or can be fully used. The use of the ECE Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-making should make it possible to benefit more systematically from the capabilities vested in particular in NGOs. The NGOs could help this process by coordinating their approach to the public administration more effectively.

The basic schemes applied to the formulation and financing of environmental R&D programmes appear to be appropriate, and working smoothly. However, the reduction in funds available for environmental R&D over recent years may be attributable to the stalemate regarding the creation of an institute for environmental protection. If this is true, then setting up the institute in the long term, while strengthening existing institutes in the short term, might be the most advisable option.

The gradual implementation of a national strategy for the promotion of environmental education on all levels is advisable. The strategy should not only deal with the contents of environmental education, educational materials and didactic matters, but should also cover the cost aspects of its introduction.

Recommendations

Recommendation 1.1:

The improvement of cooperation between ministries, departments, regional and local authorities should be seen as a priority. In preparing schemes that would enable effective cooperation at all levels of the partner institutions in the medium term, a special cooperation unit could perhaps be created in the MoEPP. It should include economic expertise in order to be able to assess costs of commitments and programmes, both national and international. Current key issues requiring cooperation are international cooperation, land administration and information (especially the land register and the land cadaster), air pollution, water management, nature conservation, introduction of cleaner technologies, and environmental aspects of agriculture as well as of transport. The creation of similar units in other key ministries - such as the Ministry of Economic Affairs - would be desirable.

Recommendation 1.2:

The formal introduction of a regional level of public management should be considered. If this is impossible, the solution of environmental management problems involving the need for cooperation between different local administrations and/or local administrations and the national Government should be sought on the basis of generally defined procedures and not case by case.

Recommendation 1.3:

Staff and other resources available for state inspection should be increased to levels that permit the full implementation of legislated inspection tasks. The indispensable strengthening of the environmental state inspection in terms of both numbers and qualifications should benefit from all relevant facilities that exist in the framework of the European Union (i.e. IMPELNET), as they are becoming available to Slovenia.

Recommendation 1.4:

The enforcement of all environmental legal instruments should be seen as a priority. The strict application of all such instruments, including procedures that might lead to legal sanctions of violations of applicable laws and regulations, should be envisaged.

Recommendation 1.5:

The finalization of the NEAP should be considered a first priority.

Recommendation 1.6:

A governmentally designed national lead agency should develop and support a comprehensive environmental information system, covering also priority areas like water or waste information. Creation and maintenance of information being expensive, the lead agency should be sufficiently equipped with staff and material resources to coordinate the different data sources with substantive authority. The agency should not only steer the conceptual development of the information system and store data, it should also service regional, national and international user groups.

Recommendation 1.7:

Existing mechanisms for making adequate environmental information available to the general public should be improved. They should particularly cover air and water quality information.

Chapter 2

INTERNATIONAL COOPERATION

2.1 International cooperation in context

The fundamental orientations of Slovenia's international cooperation relate to historical developments, wider political objectives, subject-matter requirements and the organizational and financial capacity of the country to honour the commitments associated with such cooperation. These four dimensions carry different weight, depending on the subject of the cooperation agreements. After independence in 1991, Slovenia became a member of the United Nations in 1992. It signed a trade agreement with the European Free Trade Association (EFTA) in 1995. In 1996, Slovenia joined the Central European Free Trade Agreement (CEFTA). A pre-accession agreement with the European Union was concluded in June 1996.

Regarding international cooperation on environmental matters, the commitments made previously by the former Yugoslavia (for instance the Barcelona Convention and protocols and other agreements for the protection of the seas) were accepted. The next priority was to accede to agreements that were considered important, but had not been signed by the former Yugoslavia (for instance the Basel Convention and the London Amendment on Ozone-depleting Substances). In general, the relatively small size of the country, its location in the alpine area, on the Mediterranean coast, and in the drainage basin of the Danube, as well as its location at a cross-roads in the heart of Europe determine the need for international cooperation.

The current major objectives of Slovenia are closely connected to the EU approximation process as well as national environmental priorities. However, the NEAP will not be ready for implementation before the end of 1997. Thus, except for some obvious issues, the priorities are not yet entirely clear. This inhibits the assessment of both organizational requirements and the costs of international commitments.

2.2 Cooperation within the framework of the United Nations Economic Commission for Europe (UNECE)

Air pollution. Being a small country surrounded by four neighbours, Slovenia inevitably imports and exports pollution. In 1993, according to EMEP, Slovenia was a net exporter of SO_x, NO_x and NH_3 air emissions. Most of this pollution ended up in the Mediterranean Sea, but also in Austria, Italy and to a lesser extent Croatia. Slovenia received emissions mainly from Italy and the former Yugoslavia**.**

Slovenia acceded to the Convention on Long-range Transboundary Air Pollution and its EMEP Protocol in 1992. In 1994, Slovenia signed the Protocol on Further Reduction of Sulphur Emissions and it plans to ratify it soon. In 1994 and 1995, Slovenia harmonized its legislation with the obligations under this Protocol (emission standards and fuel quality standards were set). Its Energy Strategy contains a long-term programme for the rehabilitation of large thermal units in the energy sector with measures to meet the first step target for the year 2000 (see chapter 12).

Slovenia did not accede to the 1988 NO_x Protocol but pays particular attention to the upcoming new nitrogen protocol, which will focus on reducing damage caused by photochemical pollution (ozone) from motor traffic, nitrate precipitated contamination (acid rain) and the eutrophication of ecosystems (mostly due to ammonia used in agriculture). Since 1995, as a first measure in this direction, new petrol-fuelled cars have to be equipped with a three-way catalytic converter (chapter 12). In its 1996 report to the Executive Body to the Convention on Long-range Transboundary Air Pollution, Slovenia indicated its objectives to reduce NOx emissions to 45kt/y, 38kt/y, 31kt/y, in 2000, 2005 and 2010 respectively, which represent reductions to 85, 72 and 58% of the 1987 level.

Slovenia is planning to accede to the VOC Protocol in 1997. It also actively participates in the drafting of the protocols on heavy metals and persistent organic

pollutants. So far, there is no warning system or response mechanism for transboundary air pollution resulting from industrial accidents and natural disasters.

Water pollution. Regarding transboundary water pollution, Slovenia is a transit and exporting country for running waters (in particular Danube basin waters) and also shares aquifers with neighbouring countries. It has not yet ratified the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, but a proposal to do so is before Parliament.

Other conventions. New projects as well as industrial accidents are both events likely to have transboundary effects in such a small country. Nevertheless, Slovenia has not ratified either of the two ECE Conventions on the Transboundary Effects of Industrial Accidents and on Environmental Impact Assessment in a Transboundary Context. However, the national legal and administrative framework on those two subjects is currently being completed.

The Act on EIA was voted in mid-1996, and three regulations were recently passed including the list of projects covered by EIA, which is in line with the EU list. Cross-border environmental effects are taken into consideration in the EIA regulations. The procedure for ratifying the Convention is continuing, and Slovenia should be able to ratify it by mid-1997.

Regarding industrial accidents, Slovenia has an important chemical industry concentrated mostly along the rivers Sava, Drava and Mura, which all flow to neighbouring countries. While Slovenia participates in a warning system under the Danube Programme, the question of whether or not to ratify the Convention on the Transboundary Effects of Industrial Accidents is pending. A decision will be made after the positions of the neighbouring countries and the EU on the matter become known.

The "Environment for Europe" process. The process started in 1991. Its top goal is to achieve convergence between the environmental situation in western countries and countries in transition in the shortest possible time, before looking at longer-term actions on sustainable development. To this end, the drawing-up of national environmental action programmes in every country in transition was given top priority at the Lucerne Conference. It should reflect the supreme national agreement on goals and actions for environmental protection, and be a basic tool for integrating environmental issues within other fields of socio-economic activity. It also helps to channel international funding.

In 1993, a Master Plan for Institutional Strengthening for Improved Environmental Protection (part of the Slovene Environment Project) was drawn up with a World Bank loan. It attempted to prioritize national environmental issues. However, it did not go into enough detail (brief identification of problems, no rational prioritization, no assessment of the financial costs of the projects, etc.) to serve as a firm basis for national priority setting. Today, Slovenia is still in the process of drawing up its national environmental action programme, the so-called NEAP (see chapter 1). The 1995 State-of-Environment report provides a basis for identifying problems and priorities. It seems that Agenda 21 for Slovenia drawn up by Slovene NGOs, as well as the EU Fifth Environmental Programme "Towards Sustainability" up to the year 2000, are important sources of inspiration for the long-term directions of NEAP.

Within the framework of the Pan-European Biodiversity and Landscape Strategy, adopted at the Sofia Ministerial Conference Environment for Europe (October 1995), Slovenia launched an initiative to promote work on biodiversity within eastern Europe, thus promoting east-east cooperation and developing a network of experts in eastern Europe. As a result, a group was set up under the auspices of the World Conservation Union and REC, with a view to implementing the Pan-European Strategy.

Currently Slovene NGOs are participating actively in the preparation of a new convention on public participation, which should be proposed for signature at the next "Environment for Europe" Conference in Aarhus (Denmark,1998).

2.3 Other regional and global cooperation

Participation in the Alps Convention. Slovenia ratified the International Convention for the Protection of the Alps in 1991. To date Slovenia has approved and signed three protocols to it: the Physical Planning and Sustainable Development Protocol (see chapter 3), the Nature Protection and Landscape Management Protocol (see chapter 7) and the Hillside Farming Protocol (see chapter 10). Two new protocols, the Mountain Forests Protocol and the Tourism Protocol, were approved by the Parties in March 1996. By signing the protocols to the Alps Convention, Slovenia is committed to establishing a regional strategy for spatial planning which will integrate specific parameters for environmental

protection, nature conservation and sustainable development and guarantee financial solidarity between individual regions. The goals defined in the strategy will be carried out by local authorities. Tax measures will be needed to make funds available to fulfil these new obligations in accordance with existing national legislation. Slovenia's activities will be monitored under the Convention, as soon as the monitoring system for the Alpine region is established. To this end, environmental indicators are being harmonized (1996) and will be part of the reporting procedure under the Convention in 1997.

Slovenia sees the Alps Convention as an opportunity to develop its Alpine territory (30 per cent of the whole territory) in a sustainable way, deliberately avoiding mass tourism and over-development of the region (in particular over-development of transport and energy infrastructures). It intends to combine economic development and preservation of the natural heritage. It is expected that the Convention will have effects at the local level, involving actively the local population in small border areas. Slovenia was keen to take part in the new "Alliance in the Alps" project, which aims at introducing eco-audit guidelines into municipal management. Two Slovene municipalities have been selected to participate with MoEPP support. Projects to merge protected areas or to connect ecological corridors between Austria, Slovenia and Italy are under discussion.

The Convention's implementation is also causing problems. At the national level, legislation and policies are not always in line with the obligations under the protocols. For instance, there is so far no spatial or regional plan, which is required to implement the first Protocol. The proposed protocol on transport is controversial. The Parties have conflicting views on the possible modal shift from road to railway and on expanding the rail and road networks. In particular, in the implementation of its transport policy, the EU seeks to ensure that goods can move quickly through its member countries. In 1993, an agreement on transport was concluded between EU and Slovenia to "cooperate in developing a transport system which meets environmental needs". Under this agreement, Slovenia grants "unrestricted access to Community transit traffic". The agreement recognizes that combined rail-road transport would require substantial investments. Co-financing is currently provided under PHARE and other programmes to develop infrastructure.

The Danube river basin. The basin covers 81% of the Slovene territory, hosting 80% of the population. Located upstream, this represents about 2% of the entire Danube drainage basin. In Slovenia, the water of the Danube's tributaries is used as drinking-water, and also for industrial (process and cooling waters) and agricultural (irrigation) purposes. Several large cities are located along these tributaries. Together with industry (pollution equivalent to over six million inhabitants), they are responsible for large waste-water discharges (chapter 5), flowing out through Croatia, Bosnia and Herzegovina, Yugoslavia, Hungary, Romania, Bulgaria and Ukraine.

In the late 80s, the water quality of the Danube and its tributaries deteriorated sharply. Therefore, in 1991, the Danube Environmental Programme was set up. It covers monitoring, data collection and assessment, emergency response, and pre-investment activities. It also supports institutional strengthening, capacity building and NGO activities. The Programme's first step was to analyse the environmental situation of the Danube river basin in each of the 17 riparian countries, including non-point sources of pollution and the state of biological resources. Its Strategic Action Plan sets targets to be met within 10 years, i.e. by 2005, and defines a series of actions to reach them. Each country is committed to preparing its national plan to identify needed actions and investments. As Slovenia did not become actively involved until later, it should now achieve both the short-term and the medium-term objectives. A proposal for the national medium-phase priority tasks was submitted in early 1996.

To increase the safety of the riverside population and protect drinking-water resources from accidental pollution which would have transboundary effects, effective monitoring and a Danube accident emergency warning system have been developed since 1993. An essential feature of the system is that it complies with the relevant multilateral conventions and declarations, as well as existing bilateral agreements between the neighbouring countries of the river basin.

Monitoring and standards equivalent to those of the EU already existed in Slovenia before the Programme, but the interpretation of the results was poor, and the methodology applied differed from that in neighbouring countries. Now Slovene data are comparable to data collected in Austria and Italy, however the interpretation and use of the results in planning remain to be improved. The equipment and training of the professionals are being harmonized. In

1995, 10 two-day training courses in field monitoring were financed by PHARE and taught by the International Centre on Water Studies of the Netherlands. Intercalibration of laboratories is regularly carried out. Maps on water quality have been established.

The priority now is to reduce the pollution loads from the industrial sector into the Danube river and its tributaries. Because of their limited financial resources allocated to investments, countries in transition have focused in particular on the use of low-cost cleaner techniques (see chapter 9). Under the Strategic Action Plan, nine demonstration pilot projects have been selected for Slovenia. They will start in 1997, with financial support from the World Bank.

Out of the Danube basin's total of 160 hot spots responsible for transboundary water pollution, 12 have been identified in Slovenia. Nine could be eliminated by installing waste-water treatment plants, for an estimated overall nominal capacity of 1,720,000 person equivalents. Another high priority task is reducing nutrients in the Slovene streams.

The Mediterranean Sea. Though short (46.6 km), the Slovene coast on the Adriatic Sea is of economic and tourist importance. Koper is the major national port; it handles goods for Slovenia and Austria. Slovenia adopted the Global Programme for the Reduction of Marine Environment Degradation in 1995. It ratified a number of related conventions, including the 1973 International Convention for the Prevention of Pollution from Ships (MARPOL). It is also a Party to the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and has ratified all its protocols so far, including the recent Madrid Protocol (1994). In March 1996, Slovenia presented its National Report, which outlined current conditions in Slovenia and activities performed within specially protected Mediterranean areas.

Slovenia participates actively in the Mediterranean Action Plan (MAP) and employs staff in each of the four main areas: monitoring sea quality, protected areas, preventing sea pollution and remote sensing. The MAP Centre (UNEP/Athens) provided cooperation and financial support in 1996 to conduct an extensive sea monitoring programme in the Gulf of Trieste. MAP is now entering in its second phase. Priorities have been identified but have not yet led to targets or the identification of hot spots.

Over the past years, the Adriatic Sea has become known for its acute pollution and eutrophication problems. To efficiently combat these in particular, the Interstate Commission on the Adriatic (Alpe Adria) was created at the initiative of Italy in 1970. Its members, Austria, Hungary, Italy, Croatia and Slovenia, meet annually. In 1993, a Master Plan for the Northern Adriatic was drawn up and a data centre established in Trieste. An existing action/
contingency plan to prevent oil spills in the northern Adriatic was revived in early 1995 under the Trilateral Commission (Italy, Croatia, Slovenia) for the protection of the Adriatic Sea. Slovenia also participates in the Mediterranean Water Network Initiative launched in 1992 (Rome). Finally, an integrated coastal management programme for Slovenia has recently been launched with the support of PHARE. An independent management unit acting at the local level will be set up to represent and coordinate the various stakeholders. An advisory board will be established in early 1997 at the start of the project. The objectives are to develop a master plan, to define the related investment costs, and to train local staff.

Implementation of Agenda 21. Most of the actions recommended in Agenda 21 to integrate social and economic dimensions to achieve sustainable development are covered by provisions in the Constitution or in the Environmental Protection Act. The protection and management of natural resources benefit from sectoral actions (air, forests, land resources, mountainous regions, agriculture, sea, biological diversity). Programmes to inform the public and raise public awareness have been launched. Information on the state of the environment is now available, and attempts are made to integrate environmental concerns in the different spheres of the administration. However, decisions still do not fully integrate sustainability concepts. For instance, the decision to build the east-west highway was taken before the adoption of the EIA Act. Other areas would deserve increased efforts: health and monitoring of consumer habits, waste management, and the management of hazardous chemicals. Except for farmers, the role of the more important societal groups has not been strengthened by appropriate decisions. No national sustainable development mechanisms have been set up so far.

Agenda 21 also calls for the implementation of the most important international environmental conventions. To measure the commitment of countries to those agreements, the United Nations Commission for Sustainable Development has

selected six of them because they comprehensively cover sustainability issues relevant to every country. Except for the Convention to Combat Desertification, which does not concern Slovenia, it has ratified them all, i.e. the United Nations Framework Convention on Climate Change (ratified in September 1995), the Convention on Biological Diversity (ratified in May 1996), the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer (both ratified during 1990-92, including the London Amendments), the United Nations Convention on the Law of the Sea (1982, Montego Bay) (succession to the former Yugoslavia) and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (ratified in 1993). The related national legislation has been adjusted in line with the agreements. Several other international conventions are still waiting to be adopted, but require national legislation to be modified or improved (see the ratification status of international agreements by Slovenia in annex II).

Climate change. In comparison with other developed countries, Slovenia is not a big CO_2 emitter: 6.3 tonnes/cap/year in 1990; 7.1 tonnes/cap/year in 1995. CO_2 represents about two thirds of the global warming potential of all anthropogenic greenhouse gas emissions in Slovenia. So far greenhouse gas emission inventories have been drawn up using the CORINAIR methodology. Slovenia is now preparing to draw them up using IPCC (Intergovernmental Panel on Climate Change)/OECD (Organisation for Economic Co-operation and Development) methodology, which takes into account greenhouse gas sinks. Slovenia's extremely rich biodiversity explains its interest in the Convention, as its mountainous and karstic regions could be endangered by the projected climate change and pollution, especially in the proximity of local greenhouse gas emissions.

Slovenia ratified the Convention on Climate Change in September 1995, but is not yet an Annex I Party. However, Slovenia is willing to become one and to accept the ensuing obligations. A first commitment is to draft a national communication and draw up an inventory of greenhouse gas emissions. The former is expected to be ready in 1997, and the latter by the end of 1996. The setting-up of a committee has been proposed and a strategy should then be formulated.

The target set out in the Convention requires that the greenhouse gas emissions in 2000 should not exceed those of 1990, i.e. 23.7 million tonnes/year or 12 tonnes/cap/year of greenhouse gas in CO_2 equivalent. For Slovenia, this calls for a decrease of about 13% (see chapter 4), and the country has taken measures to cut the emissions from power plants and traffic (chapters 11 and 12). No results have so far been achieved. A CO_2 tax is currently being introduced.

Protection of the ozone layer. Slovenia is committed to phasing out the production and consumption of regulated substances by 1996, as mandated by the Montreal Protocol, which it ratified in 1992. Slovenia also ratified the London Amendments (1992), but has not yet ratified the Copenhagen Amendment. The strategy to phase out ozone-depleting substances has been under development since 1992. The 1994 Comprehensive Country Programme for the phase-out served to establish the priorities for the Government and identify key policy and regulatory measures. In November 1995, the Global Environmental Facility (GEF) pledged a US$ 6.2 million grant for this purpose. In December 1995, an agreement between the MoEPP, the Slovene Chamber of Economy and the Eco-fund determined the roles of the different partners in the phasing-out of ozone-depleting substances. The funds will go to six projects (LTH, Gorenje servis, Krka Kozmetika, Lek, Trimo and Labod) (see chapter 9). US$ 2 million have so far been spent.

Nature protection. This will be one of the three main environmental priorities of the NEAP. Several actions of international importance are carried out on this issue. Slovenia ratified the Convention on Biodiversity in May 1996. However, the first draft nature conservation strategy has been under preparation since 1994. It will set out the long-term vision for local, national and international activities, taking into account the European and international global strategic documents. It will also contain proposals for the establishment of bilaterally protected areas with all neighbouring countries. Strategic biodiversity goals will be tackled through a special programme (see chapter 7).

Slovenia succeeded the former Yugoslavia as a Party to the Ramsar Convention in 1991 and designated one wetland of international importance (Secoveljske soline) in 1993. It intends to add two sites (Ljubljana marshes and Lake Cerknica) to the Ramsar list. Two wetlands are protected as important sites for endangered or rare species of wild flora and fauna. A Slovene Ramsar Committee was formed in 1994. In May 1996, it was given the mandate to apply the Convention.

Slovenia is not a Party to most of the other important conventions related to nature protection. Since 1994, proposals for accession to the Bern, Bonn and Washington Conventions have been prepared but no formal procedure has started. Although not a Party to the Washington Convention, Slovenia issues CITES certificates following the provisions of the Kyoto Resolution for non-Party States. Nevertheless, the illegal trade in pets continues, for lack of efficient border control. Slovenia will adhere to the Bern Convention once a reservation concerning brown bears has been introduced. A proposal for accession to the Bonn Convention will soon be submitted to Parliament.

Waste imports and exports. Slovenia ratified the Basel Convention in October 1993. Till 1995, Slovenia was an exporter of mainly residues and waste from mineral oil processing. The supervision of exports was lax. Since 1995, Slovenia is a net importer of wastes (chapter 6). The implementation of the Basel Convention's obligations started only in 1996. It necessitates a body of experienced customs officers to control the waste movements that Slovenia does not yet possess. Currently Slovenia is seeking authorization to import used car batteries from abroad (Croatia, Hungary and Ukraine) for its recycling unit in the Me ica valley.

2.4 Bilateral cooperation

Austria. Both countries have long cooperated. In particular, the Šoštanj power plant was an important source of air pollution not far from the Austrian border. It recently benefited from credits from the Austrian Oeko Fund and Austrian State funds for the installation of a desulphurization unit. Slovenia has also had agreements with Austria on water management cooperation on the Drava and Mura rivers since 1954. Following the 1990 floods on the Savinja river, Austria provided experts and finance to remedy and clean up the deteriorated area in this river basin. The clean-up was completed at the end of November 1995. Currently Austria helps to fund the Maribor Waste Water Concession Project. In 1995, an agreement for cooperation on land development, land-use planning and regional policy was concluded. One bone of environmental contention between the two countries is the Krško nuclear power plant.

Croatia. A Slovene-Croatian contract on water management was concluded in April 1996. It defines conditions for regulating the protection, use, and management of waters. In spring 1996, Croatia suggested that Slovenia should step up its control of the international trade and trafficking in protected species, in particular birds (falling under the Washington Convention). It should also be noted that the two countries jointly operate the Krško nuclear power plant, which lies on Slovene territory. Regarding the Mediterranean Sea, Croatia is carrying out a contingency plan for the protection of the coast.

Hungary. A water management agreement has existed since October 1994. In 1997, a new monitoring system will be jointly implemented. In July 1995, the two countries signed an agreement on timely information exchange in the event of radiological danger. A trilateral project (together with Austria) has started, aiming at ensuring the sustainable development of an area common to the three countries.

Italy. Relations with Italy have improved since negotiations between Slovenia and the EU started. Agreements on transboundary inland rivers (for instance the Soča river) and the Adriatic already existed between the two countries before (in the framework of the 1975 Osimo bilateral agreement). Under PHARE, projects are carried out to upgrade the transfrontier road traffic and improve customs capacity between the two countries.

The former Yugoslav Republic of Macedonia. On 30 May 1996, a protocol for future cooperation was concluded to strengthen ties and improve cooperation in matters of environmental protection and spatial planning. An agreement on water management in agriculture is under discussion.

2.5 International financing

The Slovene authorities are fully aware that external financing for socio-economic or environmental problems, although helpful, can play only a limited role in their solution. As a result, the projects that are being targeted by policy and management are not selected for their potential to attract foreign assistance, but for their ranking in the national list of priorities. The possibilities for obtaining foreign funds to solve problems are considered in a wider perspective. In 1995, US$ 150 million in foreign direct investment (FDI) were channelled to Slovenia, i.e. US$ 73/cap, which places it far behind Hungary and the Czech Republic.

Economic analysts concur that the country's macroeconomic stability, structural adjustments and creditworthiness provide favourable conditions for accessing international capital markets and attracting

investment inflows. In May 1996, the world's leading auditing firms upgraded Slovenia's credit rating to 'A', which was a first for a country in transition. The favourable macroeconomic environment was further stressed in the 1996 assessment of the European Bank for Reconstruction and Development (EBRD). In 1995, the country was able to raise US$ 363 million, mostly in the form of syndicated bank loans, on the international financial markets. Slovenia has numerous arrangements with the EBRD and the European Investment Bank (EIB), and the EU, but also bilaterally with Austria, France, Germany, Japan, the Netherlands, the United Kingdom and the United States.

Nevertheless, PHARE is by far the major provider of foreign assistance. Overall, it has disbursed ECU 44 million to Slovenia since 1992. So far, there has been no specific PHARE programme for the environment; however, environmental issues are included in the various PHARE programme components. In 1994-1996, PHARE spent about ECU 6 million on cross-border projects with Italy, Austria and Hungary, 25% to 30% of these funds on environment projects (nature and water protection). PHARE has also committed ECU 2.1 million through its project preparation policy component to waste-water treatment plants, sewerage networks, protection against floods, industry sanitation, natural parks, coastal management, etc. Currently PHARE is considering injecting a capital grant worth ECU 5 million into the Eco-fund in 1997-1998. Slovenia will apply to join the LIFE programme. It is willing to finance its participation in the framework of the PHARE programme (funding).

Although the financial aid for approved projects from EBRD to Slovenia is substantial (ECU 331.4 million shared between the public and private sectors), few of the projects are devoted to the environment. EBRD is assisting the municipality of Maribor in the construction of a waste-water treatment plant and solid waste facility with an ECU 12 million loan. Participation in other projects are in preparation, including a project aimed at supporting the Eco-fund.

In 1993, the World Bank granted a loan to draw up the Master Plan for Institutional Strengthening for Improved Environmental Protection (part of the Slovene Environment Project). In May 1996, the World Bank approved a DM 30 million loan agreement with the Eco-fund for a project to reduce air pollution (see below); and a DM 5 million loan agreement for the setting up of the Geo-information Center.

Recently, EIB has committed ECU 150 million for the Slovene transport modernization programme, including railways and road infrastructure. Previous EIB loans amounted to ECU 120 million.

Most countries in transition sought international financial assistance from the international financial institutions (IFIs) and donor countries for a large number of projects early in the transition process. This uncoordinated approach proved to be unsatisfactory for both donors and recipients. Consequently, the Ministerial Conference "Environment for Europe" in Lucerne (1993) decided to create the Project Preparation Committee (PPC). It was set up to facilitate the process of preparing and implementing environmental investments in countries in transition and better channel the appropriate funds. Within this framework, one project is already being carried out in Slovenia, three are matched and two are being prepared for matching. All are in line with the priorities defined in the Environmental Action Programme for countries in central and eastern Europe and the draft Slovene NEAP. They are co-financed by Slovenia and foreign donors and IFIs:

- The current Environment Project has several purposes: coal-to-gas conversion and institutional strengthening. Technical assistance is requested in order to finalize the NEAP, study the cost-effectiveness of possible abatement strategies, develop the Eco-fund, assess the gas conversion feasibility, problems and benefits. The project costs ECU 50 million, and is co-financed by the Netherlands, the United Kingdom, EU PHARE, the World Bank and the Slovene Eco-fund (see chapter 8);
- The Slovenia Environmental Infrastructure Investment Fund Project (matched), aims to support the new Eco-fund. The project costs ECU 40 million and is co-financed by Germany, the United Kingdom, EBRD and EU PHARE;
- The Maribor Waste-water Concession Project seeks to co-finance the construction of a waste-water treatment plant and waste disposal site between private and municipal partners. Amounting to ECU 60 million, this matched project involves Austria, EU PHARE and the EBRD;
- The Maribor short-term action Programme for Sewerage Investment (matched project) will cost ECU 53 million financed by EU PHARE and EBRD.

Two other projects on water-supply and waste-water treatment, and municipal solid waste management for

the city of Ljubljana have recently (mid-1996) been proposed by EBRD for matching.

In 1993, at the time when the Environmental Protection Act was adopted, it became clear that its implementation would require funds. An analysis by the World Bank (1993) showed the need to set up a project implementation unit to manage the projects to be funded. The unit would be managed through the Eco-fund, but has not yet been created. Today, the MoEPP has only one full-time staff member for the PHARE projects. Nobody is specifically responsible for coordinating environmental improvement programmes funded from foreign sources and for ensuring acceptable reporting to donor institutions.

2.6 Conclusions and recommendations

Conclusions

In general, Slovenia has succeeded in establishing a network of international cooperation that can clearly help to solve its environmental problems. Slovenia is realistic as to what it can expect from such cooperation. This attitude has yielded positive results. There are three ways in which Slovenia might strengthen its achievements. Firstly, the national priorities could be clarified by assessing the costs and benefits of options for international cooperation and further streamlining the management of actual cooperation projects. Secondly, some initiatives, to which Slovenia is a party, appear to be under-utilized at present. Finally, it also seems that Slovenia could benefit from joining a number of additional international cooperation instruments, given its current environmental concerns.

Perhaps the most important hurdle to overcome is the apparent hesitation with which the cost and other resource implications of international commitments are considered. A more forthcoming attitude towards these questions would facilitate the decisions on which international cooperation to seek and which not. It would also help to manage projects involving international cooperation. While progress has been made with regard to the coordination of initiatives taken at various levels of government in the country, additional efforts appear to be necessary - for example, with regard to information on which international forum was approached for which project. The creation of a unit for project management, proposed by the World Bank in 1993, could perhaps be accelerated and extended to cover the costing of projects for international cooperation.

A more focused aspect concerns the implementation of the Conventions on Biodiversity and Climate Change. They necessitate coordination with other sectors like agriculture, transport, energy and spatial planning. A coordinating structure at the governmental level should be created. Such a structure could also be charged with other inter-sectoral coordination, e.g. for the development of a national strategy for sustainable development. (see also chapter 1).

Before applying to become an Annex I Party to the Convention on Climate Change, Slovenia should carefully consider if it will be able to comply and meet the greenhouse gas target in time, at what cost and whether this goal fits realistically within the NEAP priorities and financial possibilities.

A second general and important aspect of the same problem concerns the delay in the finalization of the NEAP. Clear national priorities are not only a must for national policy and management, they are also a prerequisite for deciding on the need for international cooperation (from the Slovene point of view) and on the advisability of joining (from the point of view of foreign partners). Despite the obvious difficulties of coming to grips with such a complex, strategic issue, it has nevertheless to be ensured that there are no further delays.

Existing international cooperation can be strengthened in several respects. With regard to water problems, much has been achieved, but much remains to be done. Most of the tasks ahead are part of national policy and management programmes (chapter 5). In the area of international cooperation, remedial action for the 12 hot spots on the Danube tributary rivers is becoming increasingly urgent. Perhaps a review of the Slovene resolution to provide for 70% of the funds needed may accelerate the start of nine projects currently under consideration by the World Bank for co-funding. It can also be hoped that the World Bank finds a way to come to a swift decision on the nine projects.

Eutrophication and algal bloom problems in the Adriatic Sea remain acute. The ongoing Slovene Coastal Management Programme will be efficient only if coastal management programmes are also developed by Italy and Croatia. Revitalizing the Trilateral Commission (Croatia-Italy-Slovenia) and the Alpe-Adria Commission to work toward this objective would certainly be useful. Extending the cooperation to other countries bordering the Adriatic

like Albania, Bosnia and Herzegovina and Yugoslavia could also be considered.

The international cooperation on water management in Slovenia being well established, in particular through several bilateral agreements with the neighbouring countries, Slovenia might think of joining the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes as well as the Convention on Co-operation for the Protection and Sustainable Use of the river Danube. These instruments are particularly relevant frameworks for settling possible future disputes.

Slovenia being a Party to the Basel Convention, the imports and exports of waste should follow the corresponding international rules. The implementation of the Convention requires expertise within the customs service that currently does not seem sufficiently available. International cooperation might remedy the situation, because a possible future accession to the EU broadens the interest of the efficiency of the Slovene border control in this respect. Regarding the import of used batteries from Croatia, Hungary and Ukraine for waste recycling in the Me ica mine, the sanitation of the previous lead mine site is a precondition. This requires DM 6 million.

Finally, Slovenia could be recommended to join further international conventions in the area of nature and biodiversity protection. In fact, the existing tool kit, while remarkably developed in many areas, requires complementary instruments for species protection. Ratifying the Bern and Bonn Conventions, as well as the Washington Convention, seems advisable. The cost of the related commitments should be assessed, as they will necessitate an increase in staff to operate the provisions (MoEPP specialists, inspectors, customs officers). The Convention on Biodiversity requires the drawing-up of a national biodiversity strategy, with a programme and action plan. The national strategy has been delayed and has not yet been submitted to Parliament. This could prevent Slovenia from applying for GEF funds, as access to GEF funds is restricted to those countries having a GDP below a certain ceiling value and as GDP in Slovenia could rapidly pass above this level.

Recommendations

Recommendation 2.1:
The international agreements aiming at species protection should be ratified, in particular the Bern, Bonn and Washington Conventions. *(See also Recommendations 7.1 and 7.5)*

Recommendation 2.2:

Both the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the Convention on Co-operation for the Protection and Sustainable Use of the Danube River should be ratified. Consideration might also be given to the possible ratification of other relevant international agreements. *(See also Recommendation 4.5)*

Recommendation 2.3:

Slovenia should take the initiative of revitalizing the Alpe-Adria Commission and encourage its partners to harmonize their actions regarding coastal management of the Adriatic coast and to consider enlarging the Commission to other countries also contributing to the northern Adriatic Sea eutrophication.

Recommendation 2.4:

The priority for the work of the Trilateral Commission for the Protection of the Adriatic Sea in the near future should be to establish a contingency plan regarding coastal and sea pollution of the Adriatic Sea.

Recommendation 2.5:

A training programme for customs and environmental inspectors responsible for the control of the provisions of the Basel Convention should be envisaged.

Chapter 3

SPATIAL PLANNING

3.1 Spatial planning: objects and tools

Spatial development

The settlement patterns largely follow the concentration of economic activity in towns and cities and the depopulation trend in rural areas. Two basic groups of settlement areas have developed: (a) settlements in heavily urbanized plains and valleys with extensive suburbs; and (b) settlements in peripheral areas where the population is shrinking and economic activity and cultural values are disappearing. Population growth is higher in the suburbs than in cities; in town centres the number of inhabitants is even on the decline. As a result of past industrialization and subsequent restructuring during the transition period and related migration from both urban and rural areas, the socio-economic structure of these areas has changed markedly during the last three decades.

More than half the suburban working population commutes daily to the main employment centres. The urban lifestyle dominates in suburban areas and the main type of housing is individual houses. Settlements with less than 200 inhabitants form another category. Such settlements occupy 10% of Slovene territory and 20% of the population live in them. Daily commuting is minimal since the residents have relatively good access to their jobs. Rural areas have been depopulated and are less developed in economic terms. Such areas are inhabited by 25% of the population and characterized by a high level of daily commuting (table 3.1). More than half the population of Slovenia lives near 1000 large settlements where more than 40% of jobs are located. The large number of relatively small settlements (6,000) is a particular feature of Slovenia, as is the traditional attachment of the population to its rural hinterland and houses. Slovenia's largest city is Ljubljana with 300,000 inhabitants, followed by Maribor, which is less than half its size. Only these two towns have more than 50,000 inhabitants. The remaining fourteen major towns are smaller and have a population of 20,000 to 50,000 (table 3.2). The majority of towns along the border are too small to compete successfully with large cities in neighbouring countries such as Trieste, Gorizia and Zagreb.

Approximately 13.7% of all urban areas are in deteriorating environmental conditions. The renewal of settlements is slow because of a lack of financing and building regulations for renewal activities. The dynamic process of internal migration, which is a result of changes in the interregional division of labour, increases the pressure on the spatial development and calls for new infrastructure and housing investments.

Slovenia's total surface measures 20,255 km^2, of which 402.2 km^2 is in residential and business use, 8,624.3 km^2 is agricultural land, 91.2 km^2 is taken up by transport infrastructure and 11,137.3 km^2 by other uses. In the socialist era, 80% of the agricultural land was in private hands and the nationalization of urban land, which started in 1958, was not fully accomplished. Since 1984, the Fund of Building Plots has been the main institution through which local communities can acquire land for development, either by voluntary sale or by expropriation on the basis of adopted plans (since 1990, expropriation has been very rare). The emphasis of regional policies, which after 1971 aimed for balanced regional development by supporting economically weak areas, has recently shifted towards encouraging the development of demographically threatened areas and highlands. However, even though these areas occupy more than half the country's territory with one quarter of its population, State assistance to improve their infrastructure and to promote economic development has been quite modest. In recent years, State intervention in the economy focused on specific economic sectors and its regional effects have not been studied or monitored. In addition, these regional development measures have not been accompanied by fiscal and real estate policies and instruments. As a result, little has been done to improve the demographic and economic situation in these regions.

Table 3.1: Types of settlements areas according to selected indicators

Indicators	urban concentration areas		urbanized areas		rural stagnation areas		rural depopulation areas	
	No.	%	No.	%	No.	%	No.	%
inhabitants 1991 (x000)	1,033	52.4	435	22.0	271	13.7	234	11.9
density (inhab/km2)	331.0		199.8		55.4		24.3	
index of population growth 1961/91	171		120		95		67	
index of population growth 1981/91	112		101		99		88	
index of growth in number of settlements 1981/91	115		109		105		102	
number of settlements 1991	1107	18.6	642	10.8	1493	25.1	2707	45.5
work places 1991 (x000)	546	63.0	210	24.2	55	6.3	56	6.5
immigrants 1991 (x000)	547	53.0	209	48.0	11	41.0	89	38.0
net migration 1982-93	+35795	15.0	+903	9.0	-833	0.0	-13619	-13.0
daily migrants 1991 (x000)	228	47.0	84	44.0	68	57.0	66	64.0
immigrants (per 100 inhabitants)	59.6		52.2		47.2		44.5	
% of territory in Slovenia	17		10		24		49	

Source: Slovene National Report to the Habitat II Conference.

Table 3.2: Distribution of population by type of settlements

number of residents	number of settlem.	total pop. in 1961	total pop. in 1981	total pop. in 1991	% of total pop. 1961	% of total pop. 1991	index 1991/61	index 1991/81
1-50	1671	66422	48751	43802	4.2	2.2	66%	90%
51-100	1318	120275	100909	96624	7.6	4.9	80%	96%
101-200	1366	223464	199046	195678	14.1	9.9	88%	98%
201-500	1105	337545	329153	336969	21.2	17.1	100%	102%
501-1000	287	164786	184759	195161	10.4	9.9	118%	106%
1001-2000	104	95689	127951	143851	6.0	7.3	150%	112%
2001-5000	53	100569	156140	170638	6.3	8.6	170%	109%
5001-10000	23	86407	138150	153928	5.4	7.8	178%	111%
10001-50000	14	189583	276797	292997	11.9	14.8	155%	106%
over 50001	2	205717	330208	345191	12.9	17.5	168%	105%
TOTAL	5943	1590457	1891864	1974839	100	100	127%	104%

Source: Slovene National Report to the Habitat II Conference.

The basis for spatial planning is the concept of polycentric development, which was introduced in Slovenia before the Habitat I Conference in Vancouver (Canada) in 1976. This concept is still valid and proved to be very instrumental in revitalizing many towns and villages, and distributing employment, infrastructure and services more equally. There were, however, some shortcomings, particularly in regard to the methods and instruments used to implement policies based on the concept and the coordination between different levels. This led to a large number of poorly equipped and organized regional centres in the human settlements system and polycentrism at the local level, with the disintegration of some municipalities.

The traffic between regional centres is not good due to the landscape configuration, the lack of transport infrastructure and the high level of daily commuting of residents of rural areas. The planned transport infrastructure has two goals: good transport connections within Slovenia and with the outside world. Better use should be made of the existing infrastructure by modernizing it.

Tourism is concentrated in large tourist centres and has already reached the level which requires special spatial planning measures to protect the environment there.

In Slovenia, there are approximately 307,800 residential buildings. The housing stock consists of more than 650,000 housing units, of which about 225,000 are single-family houses. The average age of the housing stock is about 37 years and 46% of dwellings were built after 1970. A large number of dwellings and residential buildings are in need of major repair, especially the installation systems, which put pressure on the urban ecology. At the same time, provided some modernization work is carried out, many dwellings could provide a higher living standard, lower exploitation costs and a reduction in energy consumption; but the owners cannot afford to modernize them.

In the 1970s, international cooperation in the field of spatial planning between Slovenia, Austria, Italy, Hungary and Croatia led to the formal establishment of the Alpe-Adria Working Commission and later to the Central European Organization, the highest form of transborder cooperation in the region. Slovenia is a signatory to the Alps Convention of 7 November 1991. In 1995 it also signed its Physical Planning and Sustainable Development Protocol (see chapter 2). It is represented in the programmes on spatial planning of the Council of Europe and will participate in the Forthcoming Interregional Programme of the EU.

Land administration system

There is a land cadastre for the entire territory. Its records were established at the time of the Austro-Hungarian monarchy. Approximately 13% of the country (basically economically developed areas) has been measured again over the past 40 years. In 1981, the Register of Territorial Units and the Register of House Numbers were established, and territorial units and house number locations were registered on 1:5000 scale maps. By 1990, all locations of house numbers and the borders of the territorial units of the Register of Territorial Units and the Register of House Numbers had been digitized. The two registers were integrated into the Register of Spatial Units, which contains the basic data on house numbers, spatial district, statistical district, settlement, cadastral district, municipal and State administration unit, etc.

The Register of Spatial Units makes it possible to arrange data by defining individual units (e.g. town or village communities and city districts) according to spatial districts and to link these units directly to house numbers and data provided by the Statistical Office and other services. Links are also possible with other national registers such as the central population register, the business register, etc. The goal now is to make new numerically based cadastre plans for the entire country. The attribute part of the land cadastre (area, land use) is fully computerized, but only about 10 per cent of the graphic part is. The land register has not yet been modernized and is still maintained manually.

The land cadastre is used for the following purposes: (a) regulation of ownership (land cadastre provides data on size, type of use of land parcels, while land register gives data on ownership); (b) taxation of land; (c) planning and execution of construction; (d) legislative basis (the borders of local communities, national parks and nature protection areas are determined in the land cadastre); and (e) preservation of the cultural heritage.

3.2 Spatial planning framework

Legislation

In 1984, as a follow-up to the first Habitat Conference, which focused on social policy, the Law on Regional and Spatial Planning and the Law on Urban Planning of 1967 were replaced by new legislation on the system of spatial planning which is still in force. By this legislation, spatial planning became part of integrated socio-economic planning. The spatial planning system was defined in three laws: (a) the Law on Spatial Planning; (b) the Law on

Management of Settlements and Other Spatial Interventions; and (c) the Law on Construction.

The Law on Spatial Planning (basic spatial planning law) defines spatial planning as an activity responsible for (i) the protection and rational use of natural resources; (ii) the development of different spatial activities, and (iii) land-use coordination. According to the Law, the spatial plans of the State and the community should contain basic guidance for planning activities and the guidance of the State spatial plans are obligatory for communities. At the local level, development planning is carried out through long and medium-term communal plans. Long-term communal plans are more general and contain textual explanations of policy goals for communal development and criteria to achieve these goals; guidance for settlements development, including protection and use of water resources, natural and man-made assets; and maps with land-use provisions and spatial organizations of different activities. There is also the more detailed urban plan for settlements and the countryside plan, which are both consistent with the long-term communal plan. Medium-term communal plans have the same elements as long-term communal plans, but they are more detailed. For example, they define parcel boundaries, details of construction work, time-schedule, and a more detailed specification of the protection of environment, natural and cultural assets. Since this Law defined socio-economic planning elements, it is not used much now.

The Law on Management of Settlements and Other Spatial Interventions (spatial planning law on a lower administration level) defines the preparation of spatial implementation acts. Spatial implementation acts must include detailed conditions, guidelines and suggested solutions and measures for environmental protection. The Law defines the development, reconstruction and extension of settlements and related infrastructure in urban and rural areas, as well as instruments and regulations for the execution of agreed spatial decisions and procedures to obtain a location permit. The location permit is an administrative act that allows development in agreement with the spatial implementation act. To obtain a location permit, the local authority is required by law to get the agreement from water management authorities, the fire inspectorate, agencies responsible for nature and cultural heritage, the health inspectorate, archaeologists, etc. Thus, this Law defines the instruments and regulations for the execution of agreed spatial decisions as well as procedures for implementing the related decisions.

The Law on Construction defines conditions for the acquisition of land and plots for construction, and the management of land. The Law specifies the technical, financial and environmental requirements of the proposed projects. Their assessment is the basis for issuing a building permit, which is the administrative document needed to carry out a proposed project. Before a building permit is issued, the administration should again verify conformity with the Law, as it does with the location permit. Some modifications were made to this Law in October 1996, to define the status of the Chamber of engineers, project engineers, architects, etc. There are two levels of permit issue at the planning and building level, which represent in fact two checking procedures required by law, namely conformity with policy guidance (at the planning level) and with technical specifications and requirements (at the building level) (fig. 1.3, chapter 1). There are plans to simplify this system and have a unified building permit which will include the location permit and will be issued at the conclusion of one administrative procedure. Each development project should be included in the approved State or local spatial plan. Proposals for new projects that are not included in spatial plans require changes to these plans through procedures identical to those for preparing new spatial plans.

With independence and the introduction of a new political and socio-economic system, it is recognized in the country that the basic regulations of spatial planning adopted in 1984 should be modified to meet new realities, and the need for harmonization with European Union regulations and standards. The Slovene authorities are addressing some basic issues, such as: (a) the recognition of the equal status of private and public property; (b) the division of responsibilities between the State and local authorities, setting up new links of communication between them, and clarifying the status of the regions; (c) the abandonment of the system of social planning; (d) the introduction of more comprehensive provisions for environmental protection; (e) the introduction of a new organizational and institutional structure in the market economy (professional associations of planners; modalities for linking investment goals and spatial planning objectives).

In 1991 the Housing Law was adopted with the aim of establishing conditions for the market economy within the housing sector. In accordance with the Housing Law, a draft national housing programme, determining the housing policy by the year 2000, was also prepared in 1996 and submitted to the National Assembly. The programme intends to improve the

quality and sustainability of the living environment through rehabilitation and modernization programmes, based on a new ecological approach to technical standards, energy consumption, and building design.

The present legislation on land cadastre was adopted in 1974. A new law for the legal regulation of the land register was adopted in 1995. A basic law on survey service is in preparation. The law will specify the duties and responsibilities of the survey service and introduce the Chamber of Surveyors. A law on cadastre, a law on the register of spatial units, and a law on cartography are all in preparation. The surveying and mapping service was reorganized in 1994. It used to operate on the national and local levels, but in 1995 it became a fully national service.

Although environmental impact assessment (EIA) has been applied within the framework of spatial planning in Slovenia for the past two decades, there was no legal basis explicitly demanding its application until 1993. In the past, demands for the preparation of environmental impact assessments emerged outside the legal framework. Before financing large projects which could affect the environment, the Ljubljanska Banka, following the example of the World Bank, incorporated requests for EIA into its loans.

The Environmental Protection Act adopted in 1993 defined three main environmental protection instruments to be used in spatial planning: (a) environmental vulnerability studies (art. 51); (b) comprehensive assessments of environmental impact (art. 54); and (c) assessments of environmental impact (art. 55). According to the Act, the environmental vulnerability study at the national and municipal levels should be the basis for physical development. The study is based on a sub-division of the national territory into ecosystem areas, and some experts consider that this ecosystem approach cannot produce accurate data. The study is two-fold; it contains an environmental burden study and an environmental sensitivity study. Such a study must be prepared by the Ministry of Environment and Physical Planning in cooperation with other ministries.

On the basis of the environmental vulnerability study, the National Assembly or local authorities will determine the level of environmental protection that all regional development planning, sectoral natural resource management plans, and rehabilitation programmes must take into account. Every four years this level should be re-examined, and amended or supplemented as necessary. Prior to the adoption of national and local spatial planning documents, the party responsible for their preparation must obtain a licence from the MoEPP. The Ministry grants a licence on the basis of a comprehensive environmental impact study which the party preparing the spatial planning documents draws up. An environmental vulnerability study and a comprehensive environmental impact study are required for the preparation of spatial planning documents of the State and the local authorities.

An environmental impact assessment is intended for individual activities which are subject to approval and which could significantly affect the environment, for example projects that involve the exploitation and use of natural resources; construction; technological change related to the use, extraction, transport of raw materials and energy, etc. The assessment of environmental impact is based on the environmental impact report, which is an integral part of the licence application for an activity. The report must be prepared in a form suitable for public presentation through a compulsory public procedure. Only an accredited legal entity or person can prepare the environmental impact report. The conditions for obtaining such accreditation are prescribed by the Minister of Environment and Physical Planning.

At the end of 1996 five new regulations on EIA were adopted, of which a decree on types of environmental interference for which environmental impact assessment is necessary; guidelines for methodology for the preparation of environmental impact assessment reports; and a decree on conditions to get authorization for the preparation of environmental impact assessment reports. The conditions are now fulfilled for the practical implementation of the environmental impact assessment procedure according to the Environmental Protection Act.

A set of new normative documents is expected to be prepared and incentive actions will be carried out during the period 1996-2000. Laws and regulations will be prepared for the management of spatial development and construction (including environmental aspects); real property ownership, taxation, etc. The Government intends to (a) elaborate strategic elements of spatial development, which are now not sufficiently presented in its Economic Development Strategy; (b) promote harmonized regionalization; and (c) prepare legislation on instruments for coordinating national and regional objectives within the framework of European integration.

Institutions

Since the reorganization of the State administration in December 1994, the core responsibility for spatial planning has been with the Minister of Environment and Physical Planning. A State Secretary for Physical Planning carries direct responsibility for these issues. This provides the opportunity for unified accounting, supervision and regulation of spatial planning, use of natural resources, land-use activities and related aspects of environmental protection, in accordance with the principles of sustainable development. Within the Ministry the following departments deal directly with spatial planning aspects: the Physical Planning Legislation Department, the Department of Permit Administration and the Housing Department.

There are also a number of separate institutions which work under the MoEPP. The Office for Physical Planning performs technical and administrative tasks in relation to (a) land use, urban planning and land development; (b) the preparation of Slovenia's land-use plan, utilization and management of land; (c) the supervision of the preparation of land-use plans by local authorities.

The Inspectorate for Environment and Physical Planning supervises (a) the implementation of laws and regulations; (b) the construction and human settlement development activities; (c) housing development; and (d) survey activities.

The Surveying and Mapping Authority (a) prepares standards for the measurement and presentation of cartographic and land-use information; (b) performs administrative and technical tasks for the basic survey system and land cadastre. The Surveying and Mapping Authority has three levels: (a) the main office, (b) 12 regional surveying and mapping authorities; and (c) 46 branch offices of regional surveying and mapping authorities.

The former Institute for Protection of Nature and Cultural Heritage was reorganized. Its Department for Nature Protection became a part of the Nature Protection Authority. The remaining part of the Institute (cultural heritage) became the Cultural Heritage Authority of the Ministry of Culture.

Objectives

The Government's main objectives in its ongoing work in spatial planning are: harmonizing Slovenia's long-standing policy of polycentric development with the goals of sustainable development specified in Agenda 21 and the Habitat Agenda, and developing spatial planning mechanisms to proceed towards European integration that are compatible with EU spatial development guidelines.

MoEPP is preparing a spatial development policy document. On this basis a spatial plan will be established. This document will specify the spatial structure according to priority goals and determine conditions and norms for territorial management as well as measures for specific sectors responsible for implementing the strategy. The draft of the spatial plan contains distinct changes to the existing human settlements system. The municipalities of eight cities will take on the functions of so-called wider regional centre. At the lower functional level, 12 regional, 38 so-called wider local and 91 local centres will be established and included in the settlements system.

The comprehensive set of national policy objectives in spatial development is expected to be defined in the upcoming draft of the spatial development policy document. It is expected that among the new objectives will figure: (a) concentration of population and infrastructure facilities in major regional centres (in order to contain extensive suburbanization), and (b) revival of regionalism and orientation towards self-supporting regional development.

For transport, the objective is to establish a modern inter-city transport infrastructure which could promote further polycentric development. For land administration the objective is to establish a modern land information system (cadastre and land registry) as a prerequisite for responsible management of natural resources, protection of the environment, taxation, promotion of the real estate market and investments. The resolution on strategic objectives in tourism development, adopted on 4 February 1995, states that tourism development should be based not on building new facilities but on modernizing the existing tourist infrastructure.

At the regional level, the objectives are: (a) to promote an ecological, social and economic balance between cities and countryside, by improving the connections between cities and hinterland; and (b) to coordinate the development of the regional settlements structure with the development of an integrated public transport system (all forms of transport).

At the local level, the objectives are: (a) to promote the sustainable development of urban areas by improving land use and the existing built and natural environment through renewal and modernization, preserving old city centres and their cultural heritage, confining suburbanization, re-using degraded and using vacant urban land; (b) to introduce mixed land

use, as opposed to the previous practice of city zoning, which had negative environmental, social and economic effects and caused many urban areas to lose their identity; (c) to develop public transport and encourage bicycling and walking; private car traffic should be limited and car parks set up outside the city centre; (d) in the management of cities, to give priority to efficient use of water and of energy for heating, including the use of solar energy, and to the use of environmentally friendly building materials; (e) to see the modernization of the existing housing stock as an important part in the investment structure for the housing sector to guarantee a suitable quality of the living environment in human settlements; (f) to promote more comprehensive integration of housing policies with regional development and spatial planning policies.

Many of the above objectives were defined some ten years ago, but few have been achieved, because of inadequate instruments and the drastic socio-economic changes of the transition period. These objectives have been slightly modified to reflect new trends, such as sustainability concerns, and presented in the National Report of Slovenia to the Habitat II Conference.

3.3 Spatial planning in the transition period

During the transition period, the concern about macro-economic performance as well as the shift away from some "social values" led to a stagnation in the quality of life and in the development of human settlements. The growing social polarization and income differentiation are the major driving forces behind the process of unregulated spatial restructuring, which could result in social segregation, unbalanced regional development and deterioration of many urban and rural areas. During the transition, many problems stem from land speculation, unauthorized construction, an under-developed real estate market and taxation system, and the lack of investment. It is expected that in Slovenia, there will be considerable growth in old industrial and mining areas, which often characterize depressed regions with contaminated land. In future, these areas could create greater and more specific problems than the under-developed and demographic problem areas in general.

The transition process has contributed to steadily growing regional disparities. The redistribution mechanisms of the former system, which regulated regional development, have ceased to exist, while new ones are not yet in place. Excessive disparities in the economic, social and environmental situation of individual regions will hinder sustainable development and require an active regional policy. This concerns in particular certain rural areas, old industrial areas and areas dominated by large industrial plants. Most of these areas have considerable economic, social and cultural potential, which could be exploited by encouraging local development on the basis of indigenous resources. To achieve this it is necessary to promote a favourable business environment in terms of such institutions as chambers of commerce, business promotion centres, and regional development agencies. For example, the first regional development agency in Slovenia was established in the Dravograd region (Me ica valley) in 1995 by the Ministry of Economic Affairs, as a private institution: (a) to develop regional economic activity; (b) create and support jobs; (c) support the regional restructuring of heavy industry; (d) to provide training and advisory services. The key problems identified by the agency during its first year of operation were: (a) lack of resources; (b) lack of information and specific expertise; (c) difficult access to markets; and (d) little knowledge of environmental aspects. Nevertheless, the activity of the agency proved to be very effective and it is expected that in 1997 there will be 47 such agencies in Slovenia.

In rural areas, a good example is the programme of comprehensive countryside development and village renovation, carried out by the Centre for Countryside Development and Village Renovation in cooperation with the Ministry of Agriculture, Forestry and Food since 1991. The programme is based on the concept that the countryside and villages are uniform areas where the population, through different activities, maintains and cultivates the characteristics of individual landscapes and traditions.

The land policy continues to depend on intervention by the State in the form of spatial planning acts and administrative procedures. As a precondition for a land market, there should be a unified land information system with information on land use and owners, register of real estate, valuation of real property for transactions and for taxation. When in the absence of such legislative and organizational framework in 1993 the Constitutional Court abolished the preferential right of the local authorities to purchase land parcels, conditions were established for trade in land, which resulted in pressure to modify local spatial development plans to favour individual housing construction, at the expense of other considerations, such as the preservation of green belts along the roads and landscape concerns. At present, the majority of private land transactions are not appropriately taxed. Integration with the European Union will require further liberalization of

transactions in real property and adaptation of the related legislation to EU standards.

During the period of the socialist self-management system, the participation of the public went through very important phases and became a strong influential force in the urban and spatial decision-making process. Public participation in the planning process is much more developed in Slovenia than in other countries in transition. However, after the disintegration of the central planning system, the links between researchers, government experts and communities were severed, but no new links have been established. Those who used to participate in the decision-making process, consequently, found themselves outside its framework.

Despite the considerable volume of housing construction in past decades, there is some shortage of housing, particularly social housing and non-profit rental housing units. This shortage of housing, people's preference for a single-family house and the lack of coordination and consistency in urban planning, housing development and land administration have considerably influenced the - often unauthorized - construction in suburban and rural areas of single-family houses without sufficient communal infrastructure. This development is accompanied by the wasteful use of land, and as a result, pressure on natural assets. The National Report to the Habitat II Conference states that during the last three years only 30 - 40% of all new individual housing construction was regulated and planned. According to official statistics there are 650 illegal housing units in the country. Individual home-owners often tend to install heating systems themselves without professional assistance, so heating systems are sometimes badly fitted or inappropriate. The performance of heating systems in individual houses is not regularly checked. The total energy saving potential in buildings, in primary energy terms, ranges between 30 and 50 per cent, depending on the type and age of the building.

Since social housing funds are disintegrating, rents are low, public investment is insufficient, and the majority of private owners of the housing stock (87.7% is privately owned) cannot afford to modernize their dwellings. The modernization of the housing stock could be expected to be high on the Government's agenda, in order to prevent the quality of life and the environment from deteriorating in the near future. In addition to modernizing the existing housing stock, it is also necessary to invest in modernizing the infrastructure, restoring old city centres and rural settlements as the cultural identity of the country, if the environmental quality of urban and rural areas is to be improved.

With the ongoing land market reforms, the increase in environmental protection activities and new requirements for spatial planning, demand for a sound land administration system and good land information systems from governmental bodies, the private sector, non-governmental organizations, citizens and foreign investors, is increasing. All this urgently requires comprehensive new legislation in this area and the establishment of a modern land information system, including modernization of the land cadastre and computerization of the land register. The land cadastre in Slovenia is the responsibility of the Surveying and Mapping Authority of the MoEPP and the land register is the responsibility of the Ministry of Justice and the Supreme Court. There is an interval of a few years between the start of the project to modernize the land cadastre and the project to modernize the land register. The two modernization projects are at present managed separately.

The data in the land register are incomplete, since in the previous system socially-owned property, which was the primary form of ownership, was not properly entered into the land register. At the same time, the project to modernize the land cadastre has been implemented for several years, attribute data from the land cadastre are already computerized and a central database is established in this area. Thus, it is important to ensure the harmonization of the two projects, in particular in the area of standardization. There is a strong need to computerize the land register (at present it takes 0.5 - 2 years to enter a record). There is also a need to update land-use information (change in use) in cadastral maps. According to the law, this should be done every 15 years. However, the mapping authorities, which are responsible for such updating, do not have enough resources to carry out this task.

3.4 Conclusions and recommendations

Conclusions

During the transition period, Slovenia has successfully continued to apply the concept of polycentric development with the aim of encouraging local initiative and exploiting potential in the private sector. The Government has taken a number of important measures in regard to institutional build-up and drafting legislation on spatial planning, housing and land administration with a view to sustainable development and integration with EU.

The shift away from the centrally planned system, where spatial planning had traditionally played a key role, toward a market economy, has plunged spatial planning into a deep crisis. This crisis is exacerbated by a general move away from long-term thinking and long-term policies, and by reliance on the supposedly automatic benefits of the new approaches. The renaissance of the spatial planning system and methodology based on the concept of sustainable development, which started in Slovenia some two years ago, will be an important political issue in the near future.

Changes in the political and economic system, independence, the Constitution of 1991, and the decision to join the European Union determined the need for comprehensive legislative and system reform in the area of spatial planning. The Government of Slovenia will have to define a new role for spatial planning as a consequence of decentralization of political and economic power. In this regard it is important to establish a regional planning authority to ensure horizontal links between local authorities in the interest of balanced regional development.

The reform of local self-government and the national administration yielded many benefits in the field of spatial planning, settlements development, environmental protection and public participation. With the ongoing reforms in the territorial administration of Slovenia, the capabilities of local authorities to deal effectively with local spatial planning, housing, environmental protection, transport and communal infrastructure have increased markedly. At the same time, decentralization has led to a gap between the fledgling national spatial planning system and local planning activities. A regional spatial planning authority could harmonize local planning, in particular in the areas of municipal services, transport infrastructure and environmental protection. The region is the most appropriate level at which economic, environmental and spatial approaches could be harmonized and integrated and a minimum critical mass for development be achieved. In future the evaluation of State regional development policy should be based on monitoring the instruments and policies applied, and a monitoring system should be established to this end. Academic strategic research could be an important instrument for sustainable regional development. A further supporting element for the introduction of sustainable spatial development would be appropriate coordination between the national, local and other authorities involved.

Spatial planning and implementation should be based on concerted actions and coordination between different sectoral ministries, at national, regional and local levels (horizontal), as well as with planning authorities of different levels (vertical), which is not the case in Slovenia. Spatial planning authorities lack decision power on the use of large public investment or other financial sources, and they fully depend on the willingness of sectoral ministries to accept their arguments. A great deal needs to be done to improve inter-sectoral coordination at national, regional and local levels, particularly in the areas of urban economy, transport and rural development. For example, both the Ministry of Transport and MoEPP are engaged in planning transport infrastructure, and the coordination of these activities needs to be improved.

Slovenia's legal framework for spatial development is not yet in its final format. There are still laws in force from the former Yugoslavia, and the Slovene Republic within the former Yugoslav Federation, and there are new laws, but in many respects they are not compatible. For example, the existing legislation on spatial planning was adopted in 1984 and is based on "social ownership" of real property, which contradicts the new Constitution and other new laws. Thus, there is a need for a comprehensive reform of the spatial planning legislation. This includes spatial and land-use planning legislation at all levels, as well as building regulations.

With the adoption in October 1991 of the new Housing Act, Slovenia steered its housing policy into a new direction; it adopted an enabling approach by abolishing central administrative distribution of housing, taking measures to empower local authorities, organizing a housing market and relying on private initiative. As a result of a restrictive monetary policy, an increase in real estate prices compared with real income, and the absence of specialized financial institutions to enable housing savings and provide loans for housing, Slovenia's housing and urban ecology problems have escalated during the transition period.

There is a need for international scholarships, training courses and upgrading of university courses. It is important to develop public management programmes covering (a) management training for national and local authorities; (b) training of civil servants; and (c) modern public administration management.

Modern and harmonized land cadastre and land registration are preconditions for sound spatial planning. There must be legally defined procedures for the acquisition and reallocation of rights in land and appeal mechanisms so that the public can remain confident in the security of their titles.

Recommendations

Recommendation 3.1:

A new law on spatial planning to serve as a basis for harmonizing other legislation on land use and building should be finalized and adopted with priority.

Recommendation 3.2:

Incorporate environmental assessment procedures into the everyday operation of city development and planning, and consider whether applying an ecosystem approach in vulnerability studies is feasible, given the difficulties of defining the natural boundaries of ecosystems.

Recommendation 3.3:

Set up a register of contaminated and derelict land and define measures to help re-use such sites. *(See also Recommendation 6.5)*

Recommendation 3.4:

Develop, for local authorities, (a) a framework to take energy efficiency and environmental features (including radon concentration) of buildings into account, and (b) legal provisions to ensure regular technical inspection of the existing housing stock, in particular heating and sanitary equipment. *(See also Recommendation 13.10)*

Recommendation 3.5:

Prepare guidelines for builders, architects and local authorities on training in reducing CO_2 emissions from buildings with a focus on thermal insulation, ecologically-oriented building, energy-saving measures, environmentally friendly demolition of buildings, and re-use of building material stemming from demolition.

Recommendation 3.6:

Prepare a strategy and a programme for modernizing the building stock, taking into account energy-saving requirements as well as safety, hygiene and relevant environmental aspects. *(See also Recommendation 11.3*)

PART TWO: MANAGEMENT OF POLLUTION AND OF NATURAL RESOURCES

Chapter 4
AIR MANAGEMENT

4.1 Evolution of air pollution and underlying determinants

The composition of air pollution in Slovenia has changed over the past few years, with a decrease in sulphur dioxide (SO_2) concentration and an increase in ozone (O_3), nitrogen oxide (NO_x) and volatile organic compound (VOC) concentrations. The proportion of the contribution to atmospheric emissions from the main pollutants has fluctuated since the early 1980s, due partially to the implementation of control measures but also to a fluctuation in economic activity. Although the emissions from the energy sector have diminished, those produced by road transport, the other major source of air pollution, are on the increase (table 4.1).

Emissions

The emissions of SO_2 have fallen since 1983 (56%), while those of nitrogen oxides (NO_x) and carbon monoxide (CO) have risen. Emissions of carbon dioxide have slightly fluctuated. Between 1990 and 1995, emissions of SO_2 dropped by about 40 per cent, with a 32 per cent fall between 1994 and 1995. The energy sector is responsible for 80 per cent of this sharp decrease. In 1995 68% of NO_x emissions came from mobile sources. NO_x emissions have been on the increase since 1980, as the number of licensed motor vehicles and traffic density have surged. 1990 saw a decrease in the emission, as the thermal power plants and power cogeneration plants and industry emitted less. In 1991, emissions from traffic declined because links with Croatia and areas further south-east were interrupted. In 1992, the emissions rose in all branches of activity except industry. Since 1993 emissions have been on the rise mainly due to growing road traffic. CO emissions have increased by about 20 per cent since 1990. Those of CO_2 kept falling from 1980 to 1991, as thermal power plants, heating stations, and industry cut their fuel consumption, only to rise again mainly because of an increase in traffic. Transport is responsible for over 90 per cent of CO emissions and 30 per cent of CO_2, while the energy sector produces 40 per cent of the CO_2 emissions.

In comparison with industrially developed countries such as Austria, Italy and the Netherlands, emissions of SO_2 remain high in Slovenia. Compared with the OECD average, Slovenia has higher emissions of SO_2 per capita, although they are much lower than in Bulgaria, Estonia or Hungary. On the other hand, the per capita emissions of NO_x while comparable to those in Italy, were higher than those in Austria, Bulgaria, Estonia, or Hungary, but below the OECD average. CO_2 emissions per capita were comparable to those in Austria, Bulgaria, Hungary and Italy, but much lower than Estonia's and the OECD average. Compared with EU countries, Slovenia is not a large CO_2 emitter, annual emissions per capita were 7.1 tonnes in 1995, only two-thirds of the OECD average. Also, NO_x emissions are well below the OECD average (figs. 4.1 to 4.3).

In a transboundary context, Slovenia is a net exporter of air pollution, in particular of sulphur to Austria, Croatia and Hungary, but it was a net importer of nitrogen in 1994. However, over a long-term period (1985-94) Slovenia was a net exporter of both sulphur and nitrogen.

Sectoral pressures. Emissions of SO_2 and NO_x from industrial sources fell in 1995 compared to 1994. This reduction is attributable to the substitution of high-quality fuels for low-quality fuels, e.g. the introduction of natural gas, and to the decrease in production or the shutting-down of uneconomical technological process units (chapters 9 and 11). There is still a potential danger of critical values being exceeded in Ljubljana when cogeneration power plants burn domestic coal with a high sulphur content.

Traffic-generated air pollution is increasingly becoming a burning issue (chapter 12). The transport sector is the largest contributor of NO_x emissions. Its share in nitrogen oxide emissions increased from 50

Table 4.1 : Emissions of selected air pollutants, 1990-1995

Emissions/activities	Unit	1990	1991	1992	1993	1994	1995
SO_2	**1,000t**	**195**	**180.8**	**189.6**	**182.8**	**176.5**	**119.3**
	kg/cap	**97.60**	**90.49**	**94.89**	**91.49**	**88.34**	**59.71**
	t/km2	**9.63**	**8.93**	**9.36**	**9.02**	**8.71**	**5.89**
including:							
Public power, cogeneration and district heating	t	154,000	137,445	152,582	148,559	145,094	100,335
Commercial, institutional and households	t	17,602	21,618	19,500	18,206	15,130	9,258
Industrial combustion plants and process with combustion	t	20,464	18,878	14,825	12,891	12,883	8,276
Road transport	t	2,911	2,808	2,641	3,174	2,982	1,251
Other transport	t		4	6	9	424	182
NOx	**1,000t**	**56.5**	**53.7**	**55.2**	**61.3**	**65.9**	**66.6**
	kg/cap	**28.3**	**26.88**	**27.62**	**30.68**	**32.98**	**33.33**
	t/km2	**2.79**	**2.65**	**2.73**	**3.03**	**3.25**	**3.29**
including:							
Public power, cogeneration and district heating	t	17,228	15,458	16,148	16,588	15,991	16,518
Commercial, institutional and households	t	1,434	1,665	1,865	1,807	1,924	2,036
Industrial combustion plants and process with combustion	t	3,438	3,916	3,607	3,001	3,432	2,904
Road transport	t	34,401	32,649	33,562	39,880	41,385	43,184
Other transport	t		18	26	40	3,192	1,949
CO	**1,000t**	**76.6**	**75.4**	**77.1**	**87**	**92.8**	**91.4**
	kg/cap	**38.34**	**37.74**	**38.59**	**43.54**	**46.45**	**45.75**
	t/km2	**3.78**	**3.72**	**3.81**	**4.30**	**4.58**	**4.51**
including:							
Public power, cogeneration and district heating	t	990	918	869	969	927	1,000
Commercial, institutional and households	t	8,690	11,450	9,237	6,937	5,703	3,992
Industrial combustion plants and process with combustion	t	1,373	915	858	607	726	678
Road transport	t	65,499	61,759	65,646	77,684	83,349	83,701
Other transport	t		350	512	802	2,141	2,056
CO_2	**Mlnt**	**13.6**	**12.7**	**13**	**13.3**	**13.8**	**14.2**
	t/cap/year	**6.8**	**6.4**	**6.5**	**6.7**	**6.9**	**7.1**
including							
Public power, cogeneration and district heating	10^6 t	6.0	5.5	5.7	5.9	5.716	5.943
Commercial, institutional and households	10^6 t	1.7	1.9	2.0	1.9	1.985	2.103
Industrial combustion plants and process with combustion	10^6 t	2.7	2.3	2.1	1.7	1.996	1.707
Road transport	10^6 t	3.2	3.0	3.1	3.7	3.930	4.327
Other transport	10^6 t	..	..	..	..	0.208	0.127

Source: Submission of 1995 data to the Executive Body of the Convention on Long-range Transboundary Air Pollution.

to 68 per cent of total emissions between 1985 and 1995. Emissions will continue to rise if no measures are taken, as vehicle fuel demand is likely to grow. Currently in urban areas people favour using individual cars rather than public transport. The same could be said for longer travel distances. Fuel prices being half of those in Italy and Austria, this creates an additional traffic inflow from these two countries, and hence additional air pollution in the border area.

Ambient air quality

The ambient air quality is not a problem in all areas of the country. Some 40% of the population enjoys acceptable ambient air quality. Air problems are especially intense in specific areas prone to temperature inversion in the winter. Valleys, including Ljubljana, sometimes become engulfed with smog resulting from emissions from coal-burning furnaces, industrial facilities and traffic.

In 1994, the most heavily polluted area was around Kovk north of Trbovlje. The areas where the thermal power plants are located are those where the daily and hourly SO_2 limits and critical values were most often exceeded (by 10 times in some cases). Limit values for air pollution were exceeded mostly around the thermal power plants, but rarely in major towns. The 1995 data show some improvement in air quality because of the installation of a flue-gas desulphurization (FGD) unit in the Šoštanj thermal power plant.

Limit values of ozone concentrations are often exceeded in spring and summer. Average annual concentrations of ozone in 1995 showed some improvement over 1994 levels, while the one-hour peak concentrations were considerably lower in Ljubljana. Ozone concentration often exceeded both the 8-hour (110 $\mu g/m^3$) and hourly (150 $\mu g/m^3$) limit values in major towns. The maximum hourly value in a year is usually around 220 $\mu g/m^3$. Although SO_2 concentrations have decreased, emissions due to traffic and high ozone concentrations in the summer period are a growing concern. Nevertheless, NO_x concentrations have remained well below the critical values, probably because the location of measuring points is inadequate. Concentrations are much higher in urban areas. Table 4.2 shows the annual average concentrations of air pollutants in selected cities in 1995.

Measurements of particles are carried out in six fixed locations: Ljubljana/Figovec, Maribor, Celje, Trbovlje/Zagorje (urban area), Prapretno (industrial area) and Vnajnarje (rural area). There are also two mobile units. They all monitor total suspended particles (TSP, 0-100 $\mu g/m^3$). Mean values vary between 25 and 100 $\mu g/m^3$; maximum 24-hour values exceed the limit value (175 $\mu g/m^3$); the hourly limit value (300 $\mu g/m^3$) is exceeded at locations exposed to traffic. Continuous measurements of particle emissions are performed in three power plants. Emissions of particles are estimated according to the CORINAIR methodology for large point sources.

4.2 Policy objectives, instruments and implementation

Legislation

The 1976 Air Protection Act was replaced by the 1993 Environmental Protection Act and its implementing ordinances, which are now the main legislative instruments for the enforcement of air pollution control. They set the legal framework for a comprehensive air pollution programme.

A number of ordinances on air pollution control, adopted in 1994, regulate emissions from stationary sources. They contain emission standards for more than 100 individual organic and inorganic pollutants, which correspond to a large extent to those contained in the German Technical Instructions on Air Quality Control and the World Health Organization (WHO) Air Quality Guidelines. Emission standards were established as either general limit values or special limit values for particular equipment and plants. The general limit values have been divided into several groups of compounds (organic compounds, inorganic gaseous compounds, dust, metals, etc.). Furthermore, they are set according to the hazard potential of the pollutant, the technologies available, and the type and size of the plant. New plants must comply with the most stringent limit values. Since 1994, emission standards apply immediately to new sources, while existing sources have a grace period defined in the rehabilitation programme. The decrees prescribe maximum permissible levels of CO, NO_x, SO_2 emissions and ash for different types of fuel and plant configurations. A distinction is drawn between new and existing plants. If domestic coal is burnt,

Figure 4.1: Air emissions of SO_x

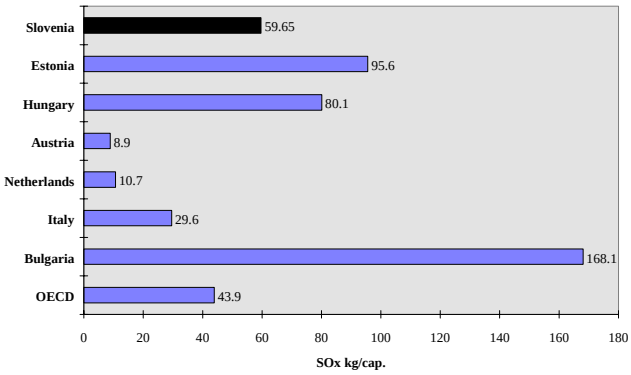


Figure 4.2: Air emissions of NO_x

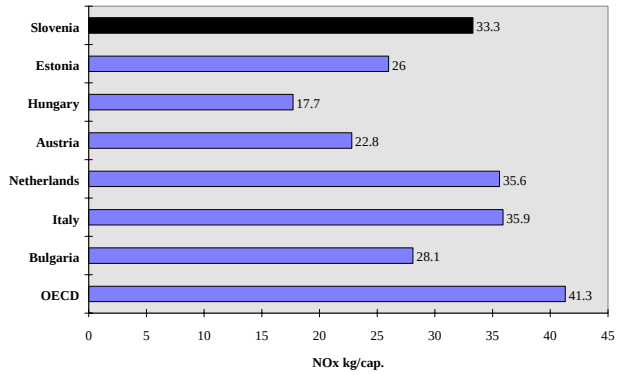
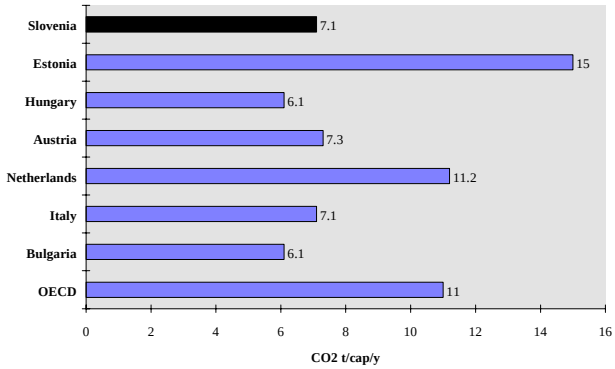


Figure 4.3: Air emissions of CO_2



Sources: OECD Environmental data, Compendium 1995. OECD EPR of Bulgaria and ECE EPR of Estonia and 1995 Annual national reporting on air pollution abatement to the Executive Body of the Convention on Long-range Transboundary Air Pollution.

Table 4.2: Concentration of air pollutants in selected cities, 1995[a)]

	SO_2 (µg/m^3)		NO_2 (µg/m^3)		Ozone (µg/m^3)		CO (mg/m^3)	
	Yearly average	Maximum 24 hr	Yearly average	Maximum 24 hr	Average yearly	Maximum 24 hr	Yearly average	Maximum 24 hr
Ljubljana	23	115	38	89	37	103	2	6
Celje	32	237	35	108	..	..	..	..
Trbovlje	48	286	..	..	..	..	..	..
Zavodnje	26	224	9	71	71	141	..	..
Kovk	58	417	11	49	75	184	..	..
Maribor	28	119	39	83	..	..	2	4
Šoštanj	29	381	..	..	..	..	..	..

Yearly average = mean annual concentration in µg/m^3.
Maximum 24 hr = peak 24-hour concentration in µg/m^3.
a) Ambient air quality standards: The yearly average limit value is 50 µg/m^3 for NO_2 and 60 µg/m^3 for O_3, based on the Ordinance on Limit, Alarm and Critical Values of Compounds in the Air adopted in December 1994.
Source: Report on air pollution in Slovenia for the year 1995.

higher emission levels than those prescribed in the decree are allowed for existing plants, i.e. 650 mg/m^3 of SO_2 instead of 400 mg/m^3. Similar provisions apply for NO_x emissions. The exceptions expire in July 2004, at the latest.

Monitoring of the environmental conditions is regulated by the 1993 EPA (arts. 67 to 74). The Act contains basic provisions for monitoring natural phenomena, emissions and immission. The State should monitor natural phenomena and immission, while the party responsible for the environmental stress should monitor emissions.

The national policies are partly based on the country's international commitments, including those of the Convention on Long-range Transboundary Air Pollution and some of its protocols; the Vienna Convention for the Protection of the Ozone Layer; and the United Nations Framework Convention on Climate Change. Slovenia acceded to the Convention on Long-range Transboundary Air Pollution and its EMEP Protocol in 1992. It also signed the Protocol on Further Reduction of Sulphur Emissions in 1994. Slovenia harmonized its legislation with the obligations laid down in the Protocol on Further Reduction of Sulphur Emissions in 1994 and 1995, and is expected to ratify it in the near future. It has not acceded to the NO_x Protocol. Nevertheless, it is collaborating actively in the development of the upcoming protocol i.e. on nitrogen oxides and related substances. It also plans to accede to the VOC Protocol. Under the Sulphur Protocol, Slovenia has to reduce its SO_2 emissions by 45% by 2000, 60% by 2005, and 70% by 2010 based on 1980 levels. Programmes for the reduction of NO_x and non-methane volatile organic compounds (NMVOC) will be included in the national programme according to future international obligations.

Slovenia has ratified the United Nations Framework Convention on Climate Change. The target requires a 6% decrease in greenhouse gas in Slovenia. The plans foresee that CO_2 emissions will be reduced by building more gas-fired co-generation plants and by using more renewable energy sources. This will also contribute to lowering CH_4 emissions, as the need for coal mining is reduced. Slovenia's energy strategy (see chapter 11) comprises, *inter alia*, goals and measures for the reduction of CO_2, NO_x and SO_2. NO_x, NMVOC and CO emissions will also drop following the mandatory equipment of cars with catalytic converters (see chapter 12).

Objectives and institutions mandated to meet them

The MoEPP is responsible for developing policies for air pollution. It enforces air pollution requirements through its Inspectorate for Environment and Physical Planning, and monitors air pollution through the Hydrometeorological Institute. Several other ministries play an important role in air pollution management. The Ministry of Economic Affairs is responsible for the energy policy and strategy, while the transport policy responsibilities are shared between different ministries, including the Ministries of Transport and Communication, Science and Technology, and Internal Affairs (see chapter 12). The Ministry of Health is responsible for ecological conditions of direct relevance to human health, including air pollution (chapter 13). The local authorities implement the national Government's decisions for a specific area or site. They also have their own local regulations and specific activities to solve local air pollution problems, e.g. installing a central heating network throughout the city and activities to enhance the switch to cleaner fuel.

Environmental objectives focus on sectoral policies, in particular those concerning energy, transport and agriculture. For Slovenia the most effective way of curbing sulphur emissions is the current long-term programme for the rehabilitation of large thermal units in the energy sector. In 1992, desulphurization of the exhaust gases from thermal power plants, supplied with indigenous coal, was identified as the highest priority. A first desulphurization unit was started up in April 1995. As a result, in 1995, sulphur emissions from the energy sector were cut by more than 40 million tonnes compared to 1994. The second FGD unit will not be adequately equipped until 2000, while the third one will operate only as the back-up for the power system. By using imported Indonesian coal of a low sulphur and ash content (0.2% and 2.0%, respectively), SO_2 concentrations in Ljubljana have been substantially reduced since 1993.

The National Air Pollution Abatement Programme is in preparation as part of the NEAP. In this programme energy, industry, agriculture and transport, will be considered to strengthen preventive measures to diminish air pollution. The programme should focus on two targets: (a) the implementation of administrative provisions; and (b) reducing emissions through sectoral policy. Administrative provisions include the ordinances such as those on

emissions of substances into the air from stationary sources and the commitments under international conventions. The prescribed emission limits have to be implemented between 1996 and 2004, depending on the type of pollutant and/or the source of pollution.

Instruments and implementation

Quality standards have been introduced for fuels. One ordinance, *inter alia*, regulates the import, the production and the supply of fuels in the transport and energy sector. The benzene, lead and sulphur contents of fuels are also regulated. In October 1995, the diesel sulphur content standard for road vehicles was lowered to 0.2%. In future, all fuels will have to meet quality requirements corresponding to the standards set by the European Community in 1993, limiting the sulphur content of diesel fuel to 0.05% by the year 2000.

Ambient air quality standards have been incorporated in view of the forthcoming European Community air quality control directives and the first priority list of substances given in the WHO Air Quality Guidelines. Ambient air quality standards are health-related. In 1994, deposition limits were also set as daily averages for: dust, 350 µg/m2; lead, 100 µg/m2; zinc, 400 µg/m2; and cadmium 2 µg/m2.

On 1 January 1997, the Government passed the Carbon Dioxide Emission Tax to reduce greenhouse gas emissions and the use of non-renewable natural resources. With this new regulation the users of liquid, gaseous and solid fuels for heating, turbines and motor vehicles will be taxed relative to the amount of CO_2 released in the burning process. Revenues from this new tax will be used to fund national environmental projects, in particular improvement of cleaner fuel production. The current tax per kilogram of emitted CO_2 is about 2% of the fuel sales price. The tax will be introduced gradually. It is already in force for all liquid fuels, but for coal the tax will take effect on 1 January 2004, and for the incineration of organic compounds it will come into force on 1 January 1998. In May 1997, a tax on new cars was introduced, of which the expected revenue (Slt 3.7 million in 1997) will represent about 30% of environment-related taxes, 55% coming from the new CO_2 tax.

Slovenia has a country-wide monitoring system for SO_2 emissions which consists of 49 stations. Most of the sites are located in town centres and urban areas. In addition, there are 7 automatic monitoring stations, which are installed in large cities and in the most polluted areas near the power plants of Šoštanj and Trbovlje. Air pollution is measured throughout Slovenia. The monitoring network is denser in heavily polluted areas. The existing network was established based on surveys of SO_2 emissions and "hot spots". The network is operated by the Hydrometeorological Institute at the same quality level than the west European systems. Real-time data on air quality are available at the Institute. Moreover, in some of the country's "hot spots" close to power stations, real-time data are shown in town grids via digital displays. When SO_2 emissions reach a certain level, power station managers are advised by local authorities to reduce production to protect human health.

Under the EPA, a decree about national monitoring, which would prescribe the network, measuring procedures, quality assurance and control, databases, reports and ownership of the data, is in preparation. The Hydrometeorological Institute is currently preparing its laboratories and monitoring network for accreditation according to international standards. The first step will be the accreditation of the laboratory for meteorological testing. The next step will include the accreditation of testing laboratories for ecological measurements, chemical laboratories and the monitoring network.

There is a survey of major industrial air polluters. However, emission information arising from the industrial processes is estimated based on recent emission measurements. Companies that pollute the atmosphere usually provide inadequate measurements/data, and in many cases they do not provide any data, thus making it difficult to gather information on emissions. Therefore, the estimates are unreliable. Furthermore, in recent years many companies have split up into smaller companies, making it impossible for the Institute to keep up with the changes. In many cases, companies do not have a person in charge of environmental issues, which makes it difficult to gain access to the data or renders the data quality unsatisfactory. However, detailed and reliable emission data are provided by the three thermal power plants, which are Slovenia's biggest polluters.

The second priority for environmental investments was given to distribution networks for natural gas, starting with the densely populated areas. Some 10,000 households and 100 larger municipal boilers will be converted to gas in the next five years. In the future, the shift from coal to natural gas will also

result in a drop in sulphur emissions. It is foreseen that the implementation of the Energy Strategy (see chapter 11) will result in annual emissions from power plants diminishing from 100,000 in 1995 to 26,000 tonnes in 2005.

To control emissions from mobile sources better, vehicles are submitted to a yearly technical examination, which also measures black smoke and carbon monoxide. Requirements corresponding to those of the EU Directives (EEC 77/143-92/55) will be included in a new regulation which is being drafted.

4.3 Conclusions and recommendations

Conclusions

In general, the situation regarding air pollution in Slovenia has developed positively over recent years, so that no extraordinary efforts appear to be currently required in air pollution policy and management. Over the last few years activities to reduce air pollution have been among the priorities of Slovenia's environmental programme. The relatively high emissions and concentrations of individual pollutants, dust-type pollution in many cases and the troubling implications for human health especially in urban areas, have made it necessary to take intensive measures to reduce air pollution on the one hand and to prevent its formation on the other.

The country has made some noteworthy improvement in its air quality monitoring system. Cooperation between the energy sector, local authorities and the Hydrometeorological Institute is excellent. Plans for further improvement should take into consideration the upcoming air pollution issues, e.g. urban air pollution from increasing road traffic. The monitoring and data collection from the industry sector need to be adapted and improved to take into account the evolving situation in the number, size and type of enterprises. A sufficient legal basis for such an activity exists in the EPA.

Measurements have shown that the air in Slovenia continues to be heavily polluted in some areas. Nevertheless, it is very encouraging that the level of pollution keeps falling from year to year. In recent years, air quality has largely improved regarding SO_2. This is due particularly to the target-oriented and sectoral policies of the Government and local communities. Slovenia has succeeded in taking steps to clean up the polluting energy producing industry and to reduce significantly the SO_2 emissions and dust particles from exhaust fumes.

The reduction of emissions in the production of electrical energy and in various industries is attributable not only to a decline in industrial production, but mostly to the implementation of rehabilitation measures. Power plants continue to improve, and are able to meet the maximum levels of emissions for SO_2 and dust particles as prescribed by law. In the total balance of pollution reduction, these measures carry the most weight.

Atmospheric emissions from industrial activities are not a major contributor to the main air pollution emissions. Nevertheless, the gradual modernization of industrial plants and technological processes, and the improvement in energy efficiency are likely to lead to a significant reduction in emissions.

Now a more difficult task still awaits Slovenia. Its geographic situation and the current transport strategy, in which the main priority is improving highways, will likely result in an increase in transit traffic, making it more difficult for the Government to control emissions from that sector. The future also holds a move towards heavy vehicles in transit, speed limitation, completion of the motorway network, and expanding public transport. The energy strategy is focusing activities on restructuring transport flows and promoting energy efficiency. In the long run, envisaged measures of transport flow restructuring involve an increased use of public transport, a decrease in specific fuel consumption and a gradual shift from road to rail transport.

Some action has already taken place. Some control technology requirements were put in place. Since 1994, new petrol-fuelled passenger cars have to be equipped with a three-way catalytic converter to meet emission standards. This should lead to reductions in emissions in the medium term. Also, cars must go through a yearly technical inspection. However, car owners are not required to replace, for example, the catalytic converter when it is defective.

The new regulations pertaining to fuels standards should considerably help reduce local air pollution from road traffic. Since 1994, the demand for diesel and petrol has surged, partly due to strong domestic demand but primarily because of cross-border purchases from Austria and Italy. Whereas pre-tax petrol prices are in line with market levels, a tax rate well below those in the EU leads to substantially lower end-use prices. Low prices induce consumption

and these purchases could, if sustained, adversely affect Slovenia's commitment to reducing CO_2 emissions. The Government keeps energy prices as low as possible as part of its strategy to constrain inflation and provide cheap energy to households and industry. However, the new CO_2 tax is a step toward increasing the fuel price and incorporating the environmental costs in it. Corresponding tax revenues could possibly be earmarked for projects and activities that will improve the environment.

The MoEPP, in particular through its Hydrometeorological Institute, and the Ministries of Transport and Economic Affairs need to strengthen their cooperation. For example, the MoEPP was not involved in the development of the Transport Strategy. The Ministry of Economic Affairs is planning public information campaigns about transport. The other two ministries should be actively involved in such an activity. There is a need for further or improved cooperation to assess the current and future air pollution trends from mobile sources, especially from urban and transit traffic better. Future trends in urban and transit traffic and consumer behaviour will be influenced by the transport, energy and environment strategies and their implementation.

As a result of the economic recovery, both car ownership and average distance travelled have increased, especially since 1992. The turnover of the car fleet, which is expected to accelerate as income levels grow, will help reduce transport-related NO_x emissions. However, the improvement in air quality resulting from new cars being more fuel-efficient will be offset by the increasing distances travelled and by the fact that new car sales are shifting to cars with bigger engines.

Recommendations

Recommendation 4.1:

Measures anticipating rising air pollution from future increases in the volume of road traffic should be prepared and taken. Monitoring of urban air pollution should be improved to provide a better assessment of urban air pollution problems in the preparation of such measures. *(See also Recommendations 12.1, 13.3 and 13.4)*

Recommendation 4.2:

Monitoring and data reporting of industrial emissions of air pollutants (including solid particulate matter) should be made more comprehensive and follow changes in the enterprise sector more closely. The project should include an action plan to ensure that industries comply with the monitoring and data collection requirements, and, if needed, some capacity building schemes for small and medium-size enterprises (SMEs) that have no monitoring capabilities and/or knowledge.

Recommendation 4.3:

Increases in the price of fuel for transport and of heat and electricity should follow an accelerated schedule, i.e. should be clearly above inflation rates. Public information campaigns and public debates should accompany the price rises.

Recommendation 4.4:

Adopting EU practice, annual technical inspections of road motor vehicles should include the inspection of combustion performances and require adjustment and/or replacement of defective parts.

Recommendation 4.5:

Ratify the 1994 Sulphur Protocol to the Convention on Long-range Transboundary Air Pollution and accede to the 1991 VOC Protocol , the 1988 NOx Protocol and to the expected new NOx protocol as soon as possible. *(See also Recommendation 2.2)*

Chapter 5
WATER RESOURCES MANAGEMENT AND WATER QUALITY ASPECTS

5.1 Water resources and quality

Slovenia is a country rich in water resources. Rainfall during an average year amounts to 1,500 mm, reaching 3,000 mm in the west and 800 mm in the east. From a total average precipitation of 32.2 billion m^3/year, about 18.7 billion m^3 drain into the rivers (of which approximately 80% flow to the Danube and almost 20% to the Adriatic Sea). The remaining precipitation infiltrates groundwater or evaporates.

Water abstraction data are included in table 5.1. Surface water abstractions include cooling water required in electricity generation.

Table 5.1: Water abstraction [million m^3/y]

	1980	1985	1990	1993	1994
Surface water	65943	66210	50461	-	65087
Groundwater	160	175	166	176	176
Other water	45	89	8	9	13
Total abstraction	66148	66475	50635	-	65253

Source: ECE/IEDS database.

Groundwater and springs

The water abstracted from groundwater aquifers and springs is used for public supply. Water balances for individual aquifers are not available. The used aquifers are mostly shallow and located in the gravel beds along the valleys, where urbanization, industry and agriculture are concentrated. A large quantity of water from rainfall and runoff infiltrates the Karstic aquifers.

Groundwater in gravel bed aquifers is located in the proximity of water users and easily tapped. The disadvantage of these sources is their exposure to the effects of urbanization, and to other environmental impacts which are difficult to control. These aquifers are located in geological formations of the Miocene to Quaternary era. They are mostly unconfined, with a relatively shallow water level. They replenish directly through the unsaturated zone and also by direct infiltration along rivers.

The south-western part of Slovenia (about 44% of the total territory) is geologically composed of carbonate rock, i.e. limestone and dolomite, the Karst region. Large underground flows occur in its fractured formations. High fluctuations of the water-table, particularly in dry periods, severely restrict direct pumping from these aquifers for water-supply. Thus, any use of water from these aquifers occurs from spring discharges, flowing along faults. Aquifers are explored by the Slovene Geological Survey, which keeps most of the information concerning their characteristics, water balances and potential uses.

The main aquifers used in Slovenia are:

Eastern part along Drava and Mura rivers: Mursko, Dravsko, Ptujsko, and Prekmursko fields, Vrbanski plateau;

Central part along Savinja and Sava river: Celjsko field, Lower Savinja Valley, Krško field, Bre iško field, Hudinja Valley, Sorško field, Kranjsko field, Vodiško field, Kamniška Bistrica Valley, Ljubljansko field;

Western part along the Vipava and Soča rivers: Vipava Valley and Soča Valley, Valley of Bolska Dolina.

Quality of groundwater

The monitoring of water quality is carried out by the Hydrometeorological Institute. The programme operates 84 sampling points in 18 different water-tables. The results show that:

- In the eastern part (Mursko and Dravsko fields), agricultural activities directly influence the quality of water. NO_3 concentrations are between 31 and 242 mg/l, and some pesticide concentrations are high, exceeding EU drinking-water standards. Potassium and zinc

concentrations are increasing in the Dravsko field.

- In the centre of the country, except for the Ljubljansko field, water quality is affected by agriculture: in the Celjsko field, NO_3 exceeds 50 mg/l, and the water contains pesticides; by industry: the Sorško and Kranjsko fields are polluted with phenol compounds and chlorinated solvents; the Kammiška Valley is highly polluted with halogenated organic solvents; and the Krško-Bre iško field is affected by intensive agricultural practices.
- In the western part (Vipava Valley), the underground water quality is relatively good.

The connections between the unconfined aquifers and surface activities and runoff are immediate. Therefore, groundwater quality has degraded for years. Unsaturated zones serving as a buffer for all kinds of pollutants, water quality will continue to be exposed to pollution during the coming years. According to official statements, the pollution has not yet spread to all aquifers. Thus, although there are exceptions, the water of most aquifers is still appropriate for drinking, according to European standards. Pollution is concentrated in zones where important industrial and agricultural activities or landfills are located.

Spring water quality in the Karstic area is also sensitive to human activities. A limited knowledge of groundwater flows in this region makes it difficult to discover the specific sources of pollution, but it is clear that landfills and untreated sewage are major polluting sources. In the Alpine hinterland, springs are much cleaner and used as a major source for domestic water supply.

Surface water

Slovenia has seven transboundary rivers: the Mura (from Austria to Croatia); the Drava (from Austria); the Sava (to Croatia); the Kolpa (to Croatia); the Sotla (to Croatia); the Vipava (to Italy) and the Soča (to Italy). 16,500 km^2 of the territory are drained into the Black Sea (part of the Danube drainage basin), and 3,750 km^2 to the Adriatic Sea. The Slovene share in the Danube river basin covers about 81% of the country, and hosts about 80% of the total Slovene population. The main characteristics of the river basins are set out in table 5.2.

In the eastern part, the Mura river discharge is 157 m^3/s, and the Drava river 268 m^3/s. The average discharge of the Sava river, in the central part of the country, amounts to 290 m^3/s. In the south, the Kolpa and Sotla rivers flow at 74 m^3/s and 9 m^3/s respectively, and the western rivers Vipava and Soča have discharge rates of 18 m^3/s and 96 m^3/s, respectively. The Sava river basin drains 12.3 billion m^3/year in 58% of Slovene territory. Sixty per cent of the total population lives in this basin, in which 10% of the labour force is employed in agriculture and 37% in industry. The western river basin (Soča and Primorska) drains 4.2 billion m^3/year and the eastern river basin (Mura and Drava) drains 2.1 billion m^3/year, and 57% of their population is employed in agriculture.

Table 5.2: Main characteristics of river basins

Rivers	Precipitation [$10^6 m^3$, mm]	Flood plains [ha]	Drainage [$10^6 m^3$/y, mm,%]	Population [% of nat. total]	Agriculture [% of nat. total]	Industry [% of nat.total]
Mura	1197 , 861	18,700	340, 245, 28	7.0	23.7	6.0
Drava	3671 , 1125	16,000	1832, 561, 50	20.9	24.3	20.7
Sava	20773, 1757	31,700	12294, 1040, 59	59.8	45.0	62.0
Total Danube Basin	25641, 1556	66,400	14466, 878, 56	87.7	93.0	88.7
Soča	5469 , 2278	2,900	3812, 1588, 70	6.4	4.6	6.8
Primorske region	1070 , 779	2,200	394, 287, 37	5.8	2.4	4.5
Total Adriatic Sea	6539, 1732	5,100	4206, 1114, 64	12.3	7.0	11.3
Total Slovenia	**32180, 1589**	**71,500**	**18672, 922, 58**	**100.0**	**100.0**	**100.0**

Source: Compiled from various sources.

To provide protection against frequent and devastating floods, about 10% of low land water - i.e. 2,490 km of river stretch - has been regulated. 800 km of water streams are protected as natural heritage, and 23,310 km preserve their natural appearance.

Slovenia participates in international projects for the protection and use of the Danube River, and signed bilateral agreements on water management cooperation with Austria, Croatia, Hungary and Italy (see chapter 2).

Surface water quality

Surface waters are monitored by the Hydrometeorological Institute at more than 100 sampling points along the main rivers. Monitoring is carried out according to a programme that was recommended by international organizations, following national, ISO and United States Environmental Protection Agency (US/EPA) standards. The sampling is done in different seasons, two to six times a year at each measurement point. The parameters which are considered to be the most important pollution indicators are oxygen content, chemical oxygen demand (COD), biochemical oxygen demand (BOD), phenols, nitrogen compounds, detergents, formaldehyde, and mineral oil.

Surface water quality is classified into 4 classes. The first-quality class covers raw water that can be used as such for drinking-water supply. Water in the second class needs pre-treatment preparing it for drinking-water supply. The third-quality class includes water polluted with degradable compounds, e.g. domestic sewage, which does not necessarily preclude its use in agriculture or as industrial cooling water. The fourth class is reserved for polluted water that is not suitable for any direct use. A description of the state and changes of water quality along the Mura river from 1989 to 1994 shows that the water quality improved to quality classes 2 to 3. This improvement can be accounted for by the rehabilitation measures taken in Austria. The situation is similar in the Drava river. The decreasing industrial pollution during recent years is considered to be the principal cause. The quality of the Sava river has also improved greatly over the past three years, but it is still between classes 2 and 3. The river Soča, like water in its entire drainage basin, is classified in classes 1 or 2.

Nitrogen balance research was undertaken at both national and regional levels in 1991 and 1994. In 1991, 569,400 ha of arable land and grassland were investigated, while the 1994 programme was carried out at the farm level and covered 152 private farms, 16 State farms and 16 small farms in the Karstic region. The comparison of nitrogen inputs from mineral fertilizers, organic manure and nitrogen depositions with outputs through harvested material and losses to the atmosphere indicated serious leaching problems throughout the territory. The range of the net balance is between 19 and 114 kg/ha (table 5.3). The high surplus in the Pomursko (100 kg/ha) and Mariborsko (114 kg/ha) regions is due to intensive agriculture and livestock breeding (four pig farms with a total of about 65,000 pigs). The adverse effects of agriculture on water resources and particularly on groundwater quality are the most noticeable in the Drava and Mura basins.

Table 5.3: Regional nitrogen balances 1991 [kg N/ha]

Region	Input atmosphere	Input mineral	Input liquid	Input total	Nitrogen uptake	Net balance
Pomursko	17	64.7	122.4	187.1	86.5	100.6
Mariborsko	17	62.5	137.8	200.3	86.4	113.9
Korosko	17	44.9	100.7	145.7	69.7	76
Celjsko	17	56	103.1	159.1	83.4	75.7
Zasavsko	17	30.8	93.4	124.2	51.7	72.5
Posavako	17	43.8	74.2	118	81.2	36.8
Dolenjsko	17	35.9	51.9	87.6	55.2	32.6
Sirse	17	43.4	79.6	123	63.5	59.5
Zgornje	17	28.2	59.4	87.6	52.8	34.8
Notranjsko	17	20.9	54.2	75.1	42.8	32.2
Gorisko	17	36.5	53.2	89.6	59.6	30
Obalno-Krasko	17	30.6	38	68.6	49.6	19
Slovenia	**17**	**47.2**	**89.8**	**137**	**70.8**	**66.2**

Source: Water pollution by nitrate in Slovenia future standards and policy instruments. HRVAT.VODE,4 1996, 15. 111-117.

Table 5.4: Water use [million m^3]

	1980	1985	1990	1994
Surface water				
Public water supply	7	9	5	11
Electricity production	65943	66210	50461	65087
Manufacturing industry	104	65	77	47
Agriculture	0.2	3.9	2.9	3.2
Groundwater				
Public water supply	99	121	132	147
Electricity production	19	15	1	6
Manufacturing industry	42	39	32	23
Agriculture	0	0	1	0.2

Source: ECE/IEDS database.

The total average flow rate of the main Slovene rivers in the Danube river basin is in the range of 715 to 805 m^3/s. The corresponding export of nutrients from Slovenia reaches 41,197 tonnes of nitrogen per year and 2,927 tonnes of phosphorus per year. Industry as a whole contributes 60% of pollution of toxic substances (i.e. metals, pesticides, organic compounds), whereas municipal discharges account for 10% and agricultural sources for 30%.

5.2 Water use and waste water

Water uses

Surface water is the dominant source of cooling water in electricity generation, while groundwater is the major source for the public supply. Overall, domestic use of water from both underground and surface resources increased between 1980 to 1994 by approximately 21%. In 1994, domestic water use totalled 87 million m^3, and consumption per head stood at some 37.3 m^3/year, i.e. around 100 litres/day.

Manufacturing and agriculture also use more surface than groundwater. In manufacturing, there was a reduction of some 50% between 1980 and 1994, which was almost equally shared by surface and groundwater sources. In agriculture, water use increased slowly, particularly from surface waters. Table 5.4 includes relevant data for selected years in the period 1980 to 1994.

Water supply

An important factor affecting water supply is the scattered supply system. Seventy-seven per cent of the water is distributed from public networks, 14% from private wells, 5% from rainwater reservoirs, and 4% from other sources. Approximately 47% of the total amount of piped drinking-water is used by households, 39% by industry and the manufacturing sector, while 8% are supplied to livestock farms, 5% to the tourist industry, and 1% to all other purposes.

Statistical data on water supply indicate a gradual increase in water losses along the supply network over time (table 5.5). The extent and physical distribution of this phenomenon is not fully described. However, most of the losses can probably be ascribed to the technical conditions of the mains and distribution network.

Table 5.5: Water losses in distribution [million m^3]

	1980	1985	1990	1993	1994
Water losses	**71**	**77**	**80**	**112**	**115**

Source: ECE/IEDS database.

Waste water

The sources of water pollution are industry, agriculture and urbanization. Measurements of the quantity of waste water generated by the different polluting sources and its material composition are not fully controlled by municipalities. Polluters do not generally monitor effluents. In regions without public supply, the problem is much more acute, as uncontrolled pollution is a potential threat to the water resources. Pollution from urbanized areas along the rivers is especially severe, while pollution caused by industry has decreased over recent years - partly as a result of reduced economic activity in certain key sectors. For example, many of the polluting heavy metal industrial companies have disappeared since 1990 (see chapter 9).

Between 1990 and 1994, the total generation of waste water followed a mild, but clearly recognizable, downward movement - to speak of a trend is perhaps too strong. This observation tallies with the equally slight reduction in water use over the same period. If manufacturing industry was mainly responsible for

Table 5.6: Waste-water generation and treatment [million m^3]

	1990	1991	1992	1993	1994
Total generation	292.0	263.8	256.8	242.8	236.5
Total without treatment	184.5	165.4	147.8	115.2	109.5
Total with treatment	107.5	98.4	109.0	127.6	127.0
Public mechanical	18.1	10.3	39.9	52.7	40.2
Industrial mechanical	22.3	24.6	20.6	26.8	22.8
Public biological	6.3	8.2	7.4	4.2	5.0
Industrial biological	1.1	0.8	0.7	0.9	0.8
Public advanced	25.3	27.7	23.5	30.7	30.0
Industrial advanced	34.4	33.9	28.4	23.2	20.7

Source: ECE/IEDS database.

the decrease in water use, it can be expected that industrial waste-water treatment also went down over the period of observation. The figures included in table 5.6 confirm this expectation. They also show a clear downward trend in the discharge of untreated waste water. However, the overall treatment performance is rather low, as secondary (biological) and tertiary treatments are not extensively developed. There are no data available on the pollution load generated, nor on the pollution eliminated in the waste-water treatment facilities.

5.3 Objectives and implementation of water policy and management

Objectives

The Environmental Protection Act (EPA) of 1993 and the national water resources strategy are the two fundamental statements of objectives for water policy and management. The EPA - including its implementing regulations - concentrates on the control of water pollution from point sources. It sets out the principles of control by State organs, local authorities and polluters, of liabilities for pollution and damage, and of public access to relevant information.

The national water resources strategy is to be prepared by the MoEPP and will be part of the national water programme. It will aim at ensuring sufficient water supply for all users. Drinking-water supply is a priority. The programme is expected to be completed in 1997. Its main strategic directions will be:

- Formulation of a sustainable water policy;
- Implementation of integrated water management;
- Creation of regional institutions and enterprises to manage water quantity and quality;
- Development of a financial system for the support of the strategy;
- Development of the inspection and control system;
- Development of an information system on the water economy.

The drinking-water quality standards that have so far been applied are those of the former Yugoslavia. New national standards are being drawn up. They will take into account WHO standards and the EU standards (see chapter 13).

A general law on water is currently under preparation. It might be enacted in 1997. Regulations required by the EPA focus on emission limits for waste-water discharges and all aspects of monitoring. They were adopted in 1996. The intention is to regulate discharges along rivers in agreement with the EC water quality directive. Regulations on the amounts and calculations of charges and fees and on EIA are also required. So far, there is no master plan for sewage and waste-water treatment.

To improve water quality, EU standard emission limit values and best available technology are the guiding principles for the MoEPP. However, it is not clear to what extent these principles currently are, or can be, enforced. The efficiency of inspection should be assessed, once the recent organizational changes have stabilized, and the organizational arrangements and resources available for inspection become clear. Efficient economic incentives or market tools to stimulate compliance with regulations require the drafting of more regulations.

Institutional set-up

The MoEPP is responsible for the overall water management in Slovenia, and, consequently, for establishing regional plans on all water aspects. The MoEPP acts to solve wider water problems, not only at the national but also at the river-basin level. The Ministry has seven institutes (see chapter 1, fig. 1.1), including the Nature Protection Authority and the Hydrometeorological Institute. The Nature Protection Authority includes in particular the water management department, which is divided into six sectors on planning, consents and permits, concessions, public services, investments and the water fund. The monitoring of groundwater sources, springs and surface waters is done by the Hydrometeorological Institute. However, according to the EPA, polluters are obliged to monitor the quality and quantity of their effluents, but not many do so.

Regarding water management, the Slovene territory is divided into eight subdivisions. They do not constitute a separate 'regional' level of administration. The inspectorates of the MoEPP are responsible for the implementation of water protection laws and serve as coordinators between the municipalities and the Nature Protection Authority. In each subdivision, the municipal authorities are responsible for exploiting, supplying and developing the water resources. Possibilities for connecting water distribution networks between different localities within the same subdivision are limited, and between different subdivisions non-existent.

The Institute of Public Health tests the quality of water in the supply system. The methodological procedures are modern and carried out according to international standards. Monitoring is done twice a year. In most cases, the measured concentrations of the selected pollutants do not exceed the maximum permitted levels. During recent years, progress has been made in harmonizing methods for measurements, types of parameters, measurement points, preparation of the monitoring database, and enforcement of decisions after accidents.

Implementation

The MoEPP decides on investments in water-supply, sewerage, waste-water treatment and technology. Since 1991, investment expenditures have amounted to DM 15 to 25 million per year and are gradually increasing. In 1996, DM 10 million were invested in clean industrial technology, DM 2.8 million in water-supply, and DM 5.7 million in waste-water treatment. The main difficulties are in financing both investments and operating costs. Therefore, water prices will probably have to be raised in the future. A full assessment of funding needs, financing requirements and the scope of possible supply price changes for water has to wait until a master plan for waste-water sewerage and treatment has been drawn up.

The level of water-supply prices is based on the Order on Water Use Payments, issued in 1995. Payments are applied to water use (distinguishing between energy and other industries) and water pollution. The pollution charges levied by municipalities differ between the subdivisions, and between water use categories (industry, agriculture and households) within them. Taxes on sewage depend on the quality and quantity of discharges.

In 1995, a regulation introducing a waste-water tax was adopted. The tax is either applied to the volume of waste water discharged, or, in the absence of appropriate measurements, to the water-supply. In the first case, the polluter pays directly to the State budget. In the second, the tax is collected by the water-supply company. The tax is proportional to the pollution loads of the waste water. It is set to cover both investment and operating costs for a technology reducing pollution loads of effluents to permitted levels. The legal provisions have not yet been fully implemented.

The MoEPP has initiated an action plan in order to manage effluents from sources of pollution. The following projects have started:

- Construction of central waste-water treatment facilities in Ljubljana, Maribor and Rogaska Slatina for the treatment of point source emissions into the Sava and Drava rivers (project cost ECU 120 million);
- Environmental recovery of the Moste reservoir to solve the waste disposal problem of the Jesenice iron factory (project cost ECU 10 million);
- Reconstruction of the waste-water treatment plant of the Medvode paper industry (project cost ECU 2.2 million);
- Second phase of the central waste-water treatment plant for the city of Ljubljana (project cost ECU 45 million).

All these projects are located within the Danube basin and benefit from international financial support

(amounting to DM 25.3 million in 1996) through the Danube Environmental Programme (see chapter 2). Slovenia is willing to cover 70% of investments with domestic funds.

5.4 Conclusions and recommendations

Conclusions

The authorities of Slovenia, in particular the MoEPP, are aware of the importance of encouraging and developing tools to deal with water management. The decision to draft and enact the "Water Law" was particularly appropriate. In the light of the arrangements made to date, the law will be a comprehensive legal framework for water management. Accordingly, it will lay the ground for the necessary managerial decisions concerning water abstraction, water-supply, preservation of water resources, water uses, and water-related taxes and other payments. The law will also prepare the ground for regulations to protect water against pollution with fuel, waste, sewage, etc. It is planned - and important - to develop all administrative tools foreseen by the forthcoming law with priority.

The most important tasks of water management in Slovenia are to ensure safe water-supply, suitable water quality in rivers and groundwaters, and water treatment facilities throughout the country. From 1980 to 1994, the domestic use of water increased by 23%. It is foreseeable that in the coming years the economy will develop. It is therefore important to develop supply systems so that safe water will be available when and where needed.

Groundwater being the main source for drinking-water supply to households, the gradual decrease in its quality is likely to become a serious concern, if countermeasures are postponed for too long. Priorities and action plans should begin to concentrate on preserving groundwater resources for drinking-water. Due to the increasing degradation of the currently exploited aquifers, it is important that deeper aquifers that are environmentally better protected should be sought, appropriately protected and managed. Planning future water resources needs a strategic programme and policy guidance, in order to direct and set up action plans. Amongst the potential protection measures, the increase in waste-water treatment performance should be a priority in order to reduce the pollution burden on freshwaters.

The overall vision for long-term water management issues is perceived as the Government's responsibility. To establish a long-term programme it is important to identify goals, priorities and budgets. One way of preparing a coherent overall strategy could be to specify (a) a national water planning programme, (b) a national master plan for water resources and sewage treatment, (c) general plans for groundwater resources, and (d) general plans for runoff basins. None of these exist today, but it is expected that the outline of the national water planning programme will be prepared - as part of the national water resources strategy - and submitted to the Government in 1997. While the national master plan should be considered a top priority, the benchmarks of the other plans would need to be used in its preparation.

The national master plan for water resources and sewage treatment could include the supply situation from natural water resources and sewage water, forecasts of demand for water by user group, statements about resource management and development policies, specified for each groundwater and river basin, regional water balances, obligations stemming from the relevant international agreements, sewerage forecasting, networks and treatment policy, and should result in action plans (development of resources, of supply networks, sewerage networks, current and optional treatment installations, economic instruments).

Groundwater basin plans could be a tool for the preservation of existing, and the development of new resources in deeper layers. The plan could in its conclusive parts be composed of a modelling section (simulating and calibrating aquifer flows), a pumping plan (evaluation of scenarios regarding pumping development, based on the calibration of aquifer flows), and an investment programme.

Groundwater and surface water could be managed together in an integrated river basin management approach. The central part of the runoff basin management plan could concentrate on runoff in relation to groundwater resources, sewage sources and discharges, reservoirs and dams, flood assessment, pollution prevention and treatment, and development of recreation and nature protection.

In the absence of an approved national strategy regarding water management, solutions to eliminate waste-water pollution from municipal and industrial sources are implemented locally on a case-by-case basis. The Water Management Department in the MoEPP has not yet established an appropriate organization and administrative scheme to improve

the planning in and coordination of the eight subdivisions, helping to coordinate actions at the local levels. Water management planning has to consider also trends in supply needs. Therefore, regular research, the collection and analysis of data with the help of an integrated database, systematic monitoring of all water resources, their quantities and quality, supply systems and user characteristics ought to be undertaken in a dynamic set-up.

The development of an adequate legal and political framework for water management has to be complemented by sufficient organizational measures. For example, despite the existence of the (regional) subdivisions, coordination between the national and the local level is difficult. It may be beneficial also to water management, if a formal regional level of administration could be established. The Planning Division of the MoEPP is not strong enough to coordinate procedures either with the other MoEPP institutes or with each of the eight subdivisions.

The Planning Division of the Water Management Department of the MoEPP should be strengthened, as it will have to take on the task of giving guidance in the priorities for plans and investments, and identify alternatives. It should be the driving force for translating the future strategic plan and the policy of the MoEPP into practical programmes. It should thus be staffed with experts in groundwater resources, runoff basin planning, water-supply and sewage treatment networks and information systems. This division should also be able to rely on advisers for strategic plans, economists and specialists for any kind of problems related to water.

In general, the MoEPP could benefit from the allocation of more budgetary funds for research. These funds could best be earmarked for the compilation of data, the presentation of critical views regarding current priority issues as well as plans for the future. It is also necessary to develop forecasting tools like modelling, as well as methods for water treatment. The establishment of a small unit inside the MoEPP for coordination with internal and external research institutes may also be fruitful.

The data needed for water management include a wide range of information aspects. At present, some of these data are collected by the Hydrometeorological Institute and the other sections of the MoEPP, and some by other ministries and municipalities. A reliable information system which includes all the needed data is necessary for the MoEPP to function successfully. A computing division, responsible for data collection, database development, data editing and analysis could serve all the MoEPP institutes and divisions. The database systems to be developed should be geo-referenced.

Monitoring is another area requiring development. So far, monitoring - including the provisions for effluent monitoring by polluters - was mostly used to show and record point sources of pollution. It should be extended to both individual and public supply systems, to help detect leakages and prevent quality incidents. The monitoring data should be used more systematically in analysis and for action plans.

Regarding the organization of monitoring activities, the linkages between the Hydrometeorological Institute, which is responsible for monitoring the natural water resources, and the Nature Protection Authority, responsible for the monitoring network through the Water Management Department, should be strengthened. The driving force for the analysis of monitoring data and the concomitant further development of the monitoring system should be the Nature Protection Authority.

Although water-supply systems have to be seen in a long-term perspective, it is necessary to take immediate action to solve acute problems that endanger the safety of drinking-water supply. More than 20% of the water-supply systems in Slovenia are not ‘organized’. Therefore, accidents of water-supply in the networks have to be prevented through particular schemes. It seems that supply systems are not functioning well for lack of maintenance. This results in water losses during distribution, and direct exposure to pollution. It is therefore necessary to evaluate the corresponding situation in each of the eight regional subdivisions, identifying major accidents that have occurred in both public and ‘unorganized’ water-supply systems. The analytical criteria that can be used in this analysis are the quality of the water, the sensitivity to environmental pollution and water losses in the networks.

Recommendations

Recommendation 5.1:

All legal instruments that are necessary for a full implementation of the provisions of the new ‘Water Law’ (expected to be enacted in 1997) should be developed with high priority. Establishing a national strategy on water management is a matter of priority. It should include measures to prevent and reduce pollution from point sources and diffuse sources.

Recommendation 5.2:

The MoEPP should decide to extend the national water resource strategy (expected to be approved in 1997) into a comprehensive long-term water management programme, including specification of mechanisms for funding expenditures. The enforcement of all relevant legal instruments should be seen as indispensable in the implementation of the water resource strategy.

Recommendation 5.3:

Water conservation measures should be defined with regard to both industrial and municipal water use. The setting of water prices at levels covering abstraction costs is a strategic objective in this connection.

Recommendation 5.4:

In the near future, the allocation of available funds to the upgrading of existing and the construction of new waste-water treatment facilities, which clearly improve treatment efficiency, should be given priority over alternative uses of funds.

Recommendation 5.5:

The regulation implementing effluent monitoring by polluters should be prepared and enforced with priority.

Recommendation 5.6:

Increased research funds should be allocated to the evaluation of water management practices as well as the formulation of alternative options. The Planning Division of the MoEPP should be put in a position enabling it to play the leading role in the specification of water management plans and related investment programmes. If the creation of a formal regional level of administration is impossible, the Water Management Department of the MoEPP should implement regional water management.

Recommendation 5.7:

Monitoring activities (regarding ‘immissions’) should be systematically extended to cover all existing water-supply systems, not only the public supply systems.

Recommendation 5.8:

Monitoring data (regarding ‘immissions’) should be more extensively and systematically used in programme analysis and for the preparation of action plans.

Chapter 6

WASTE MANAGEMENT

6.1 Waste generation, reuse/recycling, exports/imports, treatment and disposal

The data on the amounts of waste generated by sector and their material composition are roughly known but incomplete. The different institutions involved in data gathering in the past used different methodologies and practices, and have frequently changed methodology. This probably resulted in under-estimates, particularly of industrial waste. Moreover, until recently, there were no legal requirements concerning data reporting and collection. As a result, the data reported here are to be interpreted with care but can be considered representative. The sectoral designations used in figure 6.1 and tables 6.1 and 6.4 correspond to standard practices, but food-processing wastes are included in agricultural and not in manufacturing wastes.

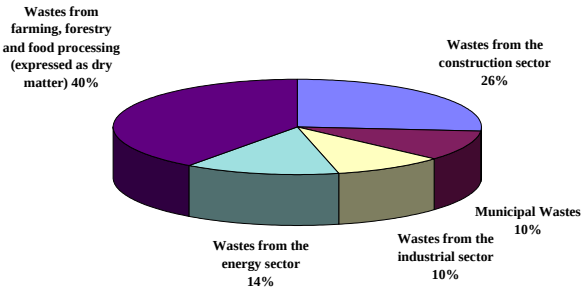
Municipal waste

In 1995, municipal wastes amounted to some 850,000 to 900,000 tonnes and accounted for about 10% of total waste generation (see figure 6.1). Roughly 94% of this amount was household and assimilated waste, including bulky waste (mixed with hazardous substances and car wrecks). The remaining 6% cover municipal waste-water treatment sludge (5.4%), household wastes containing problematic or hazardous substances, and hospital wastes.

Household wastes containing problematic or hazardous wastes - unless they are collected separately, like car batteries - contribute significantly to the hazard potential of domestic waste.

The collection and disposal of municipal waste is, as a rule, performed by the existing municipal services, which are adapting to the provisions of the Environmental Protection Act (EPA) and the Law on Commercial Public Services. The percentage of the population covered by regular waste collection networks has grown from 64% in 1987 to approximately 76% in 1996.

Figure 6.1: Shares of major groups of wastes in the total quantity of 8.75 million tonnes
[Estimate of the situation in 1995]



Source: Strategic Guidelines on Waste Management, MoEPP, 1996.

The collection of waste sorted at the source occurs only sporadically, and mainly in north-eastern Slovenia. Some municipalities like Radovljica have started successful pilot projects, others already do it as a matter of routine, like Vrhnika, Murska Sobota and Velenje. A limiting factor is the lack of composting or other recovery plants.

The collection and disposal of municipal waste is organized by 50 local public enterprises. Almost all municipal wastes end up at the 54 municipal waste landfills. The practice of dumping waste on illegal tips and old junk-yards has been more or less stopped. However, industrial wastes that comply with the criteria for the disposal of municipal waste (i.e. do not fall under the terms of the regulation on dangerous substances) are dumped together with municipal wastes. In many cases, discarded car wrecks end up in unregulated and inappropriately located junk-yards.

Table 6.1: Estimated waste trends, 1995-2010

Type of waste	Quantities [mln tonnes]		
	1995	2000	2010
Municipal waste	0.9	1.0	1.2
Construction waste	2.3	2.3	1.7
Mining and manufacturing waste	0.9	0.9	0.9
Energy waste	1.2	1.3	1.4
Agricultural, food and forestry waste [dry matter]	3.5	3.8	4.0
TOTAL	**8.8**	**9.3**	**9.2**

Source: Strategic Guidelines on Waste Management, MoEPP, 1996.

There were 522 waste-water treatment and sludge treatment facilities in 1994 (422 industrial and 100 municipal). Some waste-water treatment sludges are used in agriculture or in recultivation of degraded surfaces, but the bulk is deposited at municipal landfills.

The 54 municipal landfills are operated without complying with the applicable technical, geological or hydrological requirements. Only 16 have a legal operating permit. In the period 1991-1994, the remediation of 18 active landfill sites began. For four of them, modern solutions have been implemented concerning leakage water, degassing, monitoring, disposal technology and decommissioning. The remediation process is still continuing for the remaining 14 sites.

The total available capacity of all landfills amounts to approximately 13 million m^3. Even if the waste volume is reduced by compression and there is zero growth in the annual quantities of waste, all sites will be filled up in 5 to 7 years' time. Pressure on the present municipal landfills is rising because of the excavations of the scattered illegal disposal sites. Their number is estimated at 50,000 to 60,000. They contain an estimated 10 million m^3 of waste. More precise data have been collected on 6,000 of them containing more than $1m^3$ waste; their rehabilitation has started at the local level. About 700 karstic caves have been illegally used as waste deposits (chapter 7).

Leakage from legal and illegal waste dumps has contaminated the drinking-water supply in some areas. Near Ptuj, groundwater pollution with various pesticides was detected in 1989. Water wells were temporarily disconnected, and 60,000 people suffered a water shortage during one month. The pollution arose because a factory had dumped its wastes contained in iron barrels, which started to rust, leaking and contaminating groundwater.

In the area of Bela Krajina, polychlorinated biphenyl (PCB) was dumped in a number of karstic pits. Subsequently, a local surface river was contaminated and could not be used for the abstraction of drinking-water. This problem, detected in 1983-1984, was solved by the end of the decade.

In the future, the quantities of domestic waste will increase as consumption rises and more households are incorporated in the regular waste collection network. The sludges from a growing number of municipal waste-water treatment plants will add to this trend, as will the growing number of discarded car wrecks.

Mining, manufacturing and energy waste

In 1995, manufacturing and the energy sector generated almost one quarter of the total waste, or some 2 million tonnes, of which about 41% came from energy production, 29% from manufacturing and 16% from mining.

The quantities of generated waste are expected to grow till the year 2000, as the economy expands. Up to 2000, no new power plant is planned, but a minor increase in energy waste is expected due to the introduction of further flue-gas desulphurization facilities in thermal power stations. In the municipal energy sector, especially in Ljubljana, a fuel switch is taking place to a type of coal which will produce fewer residues after combustion.

Some factories produce and accumulate waste, including hazardous waste, on their premises, sometimes without any control. Soil has been contaminated in industrial areas because of the inappropriate storage of raw materials and wastes and because of spillage.

However, the bulk of industrial wastes is deposited at sites destined to receive either single or mixed waste

types. There are currently 13 such sites, including the landfill at Ljubljana for the disposal of slag and ash generated in the district heating and power plant of Ljubljana, and the landfill for selected hazardous wastes mainly from local industry (manufacturing, supply and use of coatings) in Metava. Some of these waste repositories, as well as the abandoned landfills, have been inadequately managed. The technical solutions of the resulting problems require considerable investments.

Two incineration plants for special industrial wastes operated in 1995: Lek-Lendava (pharmaceutical wastes, capacity 7000 t/y) and Pinus-Rače (phytopharmaceutical wastes, capacity 1000 t/y).

The 1986 Statute on the Handling of Special Waste also covers dangerous substances and remains in force. It obliges companies to keep records of hazardous wastes. Available data suggest that the generation of hazardous waste fell sharply between 1987 and 1992, and rose from 1992 to 1993.

The licensing of companies for the collection and disposal of dangerous waste is also regulated in the same instrument. It stipulates that companies should be equipped with adequate storage space, facilities, technologies and qualified human resources. In 1991, the first enterprise that fulfilled all the conditions prescribed for collecting and disposing of hazardous waste was registered. Until August 1996, the licensing and control of these conditions had been the responsibility of the Ministry of Health and the Health Inspectorate, whereas the records were kept by the Chamber of Economy. Since then, the tasks have been transferred to the Nature Protection Authority and its Inspectorate for Environment and Physical Planning.

The number of licensed companies grew to about 40 in 1996. The quantity of hazardous waste dealt with has also grown. It includes the waste from mineral oil production, used tyres, electro-plating sludge and waste solvents. The biggest share (around 75%) stems from used car lead batteries.

Construction waste

The recent expansion of the construction industry is reflected in its waste generation, currently reaching an annual 2.3 million tonnes. This is equivalent to more than 25% of waste generation in 1995. The new definition of construction waste includes excavation wastes, concrete and brick wastes, asphalt wastes and all demolition wastes.

Some 30% of these wastes arise from excavations. This material is to a large extent reusable in surface construction. Problems are linked to construction wastes from new constructions and reconstructions, and discarded concrete, bricks and gravel from the demolition of old structures in residential areas.
The high level of generation of construction waste is expected to continue till 2005. The management of construction waste is not regulated. Consequently, much of it seems to be dumped at landfill sites and may accelerate the exhaustion of capacities of municipal sites.

The construction activities causing the increase in waste generation primarily result from the national programme of motorway construction, the railway development programme, the development programme for Brnik airport, the construction of hydro-power plants on the Sava river, as well as the programme of reconstruction and modernization of highways and local roads.

The quantities of mining by-products, predominantly tailings, will gradually decrease as coal mines are abandoned, while the amount of wastes from the processing and refining of stone aggregates (gravel, sand, pebbles from stone pits) will follow the trends in construction activities.

Agricultural, food and forestry wastes

Farming, forestry and food processing generate 3.5 million tonnes of waste annually, measured as dry matter, while their actual mass is at least 4 to 6 times larger. The total amount is composed of animal tissue waste (approximately 0.05 million t/y), plant tissue waste (0.8 million t/y), animal faeces including spoiled straw collected separately and treated off-site (about 1.57 million t/y) and forestry waste (1.1 million t/y).

Small-scale livestock farming is a major source of effluent waste biomass. Septic tank residues constitute a similar problem for the contamination of underground water reserves. At present, the average input of fertilizers and other chemical compounds to agricultural land amounts to 35.6 kg/ha nitrogen, 20.9 kg/ha phosphates, 23.3 kg/ha potassium, 1.1 kg/ha pesticides, up to 5.4 tonnes/ha of solid animal waste and 8 m^3/ha of slurry.

Radioactive waste

Radioactive wastes - which are not covered by the data used for figure 6.1 - are generated by the NPP

Krško, the Research Reactor TRIGA M II, hospitals, research institutes and industry, and in the past also by the irovski Vrh Uranium Mine.

NPP Krško. NPP Krško was established as a common utility of Croatia and Slovenia. The corresponding agreement determined that half of the waste should eventually be stored in Croatia, the other in Slovenia. The agreement was never implemented. At present, all the waste and spent fuel is kept at the NPP site.

All low and intermediate radioactive wastes generated by the NPP Krško are packaged into 200-litre drums. Altogether 10,541 drums (approximately 753 per year), with an average specific activity of 31 GBq/m^3, had been stored by the end of 1995. Compaction and super compaction of standard drums was carried out in 1988/89 and in 1995. At the end of 1995, the amount of low and intermediate level radioactive wastes, stored at the Krško NPP, was 1,873 m^3. In addition, 442 spent fuel assemblies are stored in the storage pool.

Research Reactor TRIGA Mark II. Other low and intermediate radioactive wastes generated in Slovenia, mainly by research reactors and smaller users (hospitals, industry, research institutes), are stored in the Low and Intermediate Level Radioactive Waste Interim Storage, constructed in Podgorica next to the Research Reactor TRIGA Mark II. The wastes are currently stored in 145 drums with an activity ranging from 3 to 30 GBq. Another 97 bigger contaminated items, with a total activity of 5400 GBq, as well as 234 sealed sources with a total activity of 1000 GBq are also stored there.

Inside the building of the research reactor, 313 fuel elements are stored. Negotiations on the shipment of 218 irradiated elements are nearly finished and it is expected that the spent fuel will shortly be re-exported to the United States. The remaining 95 fuel assemblies will be used by the reactor through its life span.

irovski Vrh Uranium Mine. There are two disposal sites for the radioactive waste from past uranium mining and milling:

- One for mill tailings generated by the former ore processing plant, with an area of 4 ha with about 600,000 tonnes of material containing 80 g of U_3O_8/t and 8.6 kBq/kg of Ra-226; and
- One mine waste rock deposit with red mud from ore processing, totalling 1,500,000 tonnes of material with an average content of 70 g of U_3O_8/t and a total activity of 15,200 GBq.

Non-uranium mines, thermopower plants, aluminium and phosphate factories have also generated highly radioactive wastes, e.g. roasting residues of Hg ore, mine tailings and dust in the vicinity of coalmines (Kočevje) and thermal power plants (Šoštanj, Trbovlje), red muds from former aluminium processing plants (Kidričevo), gypsum landfill from phosphate factory (Hrastnik). These contain up to 10 times more uranium and thorium than natural background levels. Under current regulations, they are not classified as radioactive waste, although their use would be unacceptable, since the radioactivity levels can significantly exceed the limit targets adopted in western countries (Germany, United States). They have been deposited over several hectares of land (in Šoštanj, Kidričevo, Kočevje) which have yet to be recultivated. A ministerial decree on threshold levels of radioactivity and use of such materials and surfaces is being prepared.

Reuse and recycling

Iron, non-ferrous metals, glass, paper, fabrics, used car batteries, plastics and waste oil are considered as secondary raw materials. Slovenia has a long tradition of collecting and reusing them.

The collapse of the former Yugoslav market for secondary waste materials, the loss of customers, as well as contractual arrangements in other former Yugoslav republics, have resulted in less reuse and recycling. Only after 1993 could an increase in the use of mass content of wastes be observed, or at least a reversal in the negative trends. The reversal was due to an increase in the production of iron and steel scrap, and, partially, of plastic. The companies relying for their production on scrap as additional input raw material, are importing selected and adequately prepared scrap. Such demand exists for residues of stimulants and fodder; residues of grease and oils; timber residues; waste paper, and cardboard. Supply and demand for waste materials for reuse and recycling are partly organized in the framework of the 'Waste Material Stock Exchange', initiated by the Chamber of Economy. The share of waste flows for reuse and recycling that passes through this market is continuously increasing. The amounts traded are generally separated at the source, can be reused either directly or after only minor treatment, and are easy to transport.

The Waste Exchange does not seem to have exhausted the potential for reuse or recycling. Collection of sorted municipal waste at its source is in its infancy. In the case of waste gypsum from TiO_2 production, the waste product could in principle be reused to some extent in cement production through relatively inexpensive changes in the production processes. So imports of raw materials might be reduced or avoided by applying economic or regulatory instruments - provided that a market for such gypsum exists or can develop.
Besides construction wastes, slag and ashes from thermal power plants and metallurgic plants can serve as construction material, as well. The use of these materials in construction may lead to a gradual reduction of their quantities for disposal. The ashes from the Velenje TPP are already used either as building material for dam construction or, to a lesser extent, as filling material for exhausted mines, thus counteracting the subsidence of the ground above the mine.

Export and import of hazardous waste

Data on waste export show an increase between 1991 and 1994. In 1994, around 5,500 tonnes of hazardous waste - or roughly 10% of the annually produced amount - were exported, mainly to the neighbouring countries and some EU member States. The residues and waste from mineral oil processing and storage constituted the biggest share (about 80%). Until 1994, these data were mere estimates by the Chamber of Economy. In 1995, monitoring was tightened under the Basel Convention and revealed that 1,986 tonnes of hazardous waste were exported and 22,124 tonnes imported.

6.2 Instruments of policy and management

Legislative basis and implementation (excluding radioactive waste)

The Environmental Protection Act is the fundamental basis for waste management. It includes definitions of wastes, as well as the tasks of identified public administrations and services. Furthermore, it lists the instruments available to the MoEPP in waste management, and stipulates the development of a strategic waste management plan as part of the NEAP. Finally, it describes the financial obligations of the parties involved in environmental protection, and the operations of the Eco-Fund (see also chapter 8).

Currently valid acts and implementing regulations concerning waste management are listed in tables 6.2 and 6.3. The tables also contain the main objectives of the legal instruments, as well as the names of the bodies that are responsible for their implementation.

Whereas most of the acts were drawn up and enacted after independence, the majority of the implementing regulations stem from before that time. In view of this situation, and as Slovenia seeks membership of the EU, the following developments have been put in motion:

- Adaptation of the legal provisions - such as the definitions of waste categories - to the EU legal framework; and
- Development (or adaptations of existing regulations, as required) of all regulations required by the laws to meet all their goals.

Accordingly, work is under way on the following regulations:

- Use of sewage in agriculture
- Application of fertilizers (both organic and mineral) to soil, with particular attention to areas of shallow aquifers
- Construction, operation and decommissioning of landfills
- Classification of wastes
- Conditions for obtaining licences for waste management
- Management of hospital and similar wastes
- Registration and documentation of waste
- Packaging waste
- Used oil
- Slaughterhouse waste.

Legislative basis and implementation for radioactive waste

The management of radioactive waste is still governed by the former Yugoslav 1984 Act on the Protection Against Ionizing Radiation and Special Safety Measures in the Use of Nuclear Energy, as well as 15 implementing regulations. The most relevant of these is that on the Collection, Recording,

Table 6.2: Laws regarding waste disposal

LAWS	GOALS	RESPONSIBILITY
1. Environmental Protection Act (1993, 1996)	This law aims to safeguard human health and the environment. It is the basis for the establishment of standards and other regulations. The law deals with all categories of waste, except radioactive waste, which is treated separately.	MoEPP Other ministries
2. Law on the transport of dangerous goods (1990)	Regulates the conditions for the transport of dangerous goods and their disposal.	Ministry of the Interior Ministry for Transport and Communications Ministry of Health
3. Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1993)	Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	MoEPP Ministry of Health Ministry of Economic Relations and Development Finance Ministry
4. Law on public services (1993)	Regulates the provision of public services.	Ministries concerned
5. Plant protection law (1994)	Lays down the pesticides (phytopharmaceuticals) used for the protection of plants. Stipulates how pesticides should be used, stored and what should be done about their waste and packaging.	Ministry of Agriculture, Forestry and Food Ministry of Health

Source: MoEPP, 1996.

Table 6.3: Implementing regulations for waste management

LAWS	GOALS	RESPONSIBILITY
1. Statute on the handling of special waste containing dangerous substances (1986, 1989, 1996)	Regulates the handling of dangerous waste, lays down categories of waste, specifies which waste is dangerous and how it should be eliminated, lays down the obligation to record dangerous waste and supervise its handling and elimination.	MoEPP Other ministries and their inspectorates
2. Decree on the export, import and transit of waste (1996)	Lays down the conditions for the export, import and transit of waste and their supervision. The Decree aims to implement the Basel Convention.	MoEPP Ministry of Health Ministry of Economic Affairs Ministry of Economic Relations and Development Finance Ministry
3. Regulation on the handling of waste oils (1980)	Lays down the conditions for the handling of waste oils. It determines the categories of waste oils and specifies the methods for handling them. It sets limits on oil waste.	MoEPP
4. Technical regulations for the handling of manure and the installation of septic tanks (1985)	Lays down general instructions for the storage of livestock manure and slurry, and sets standards for the size of manure heaps. Determines categories of septic tanks, their size and design.	MoEPP
5. Regulation on the handling of waste from the leather and leather-processing industries (1983)	Stipulates the handling of waste from the leather and leather-processing industries (leather, polyurethane, cardboard, paper and wood, metal waste).	MoEPP Ministry of Health Ministry of Agriculture, Forestry and Food
6. Decree on the handling of contaminated medical waste (1994)	Concerns the handling of medical waste that because of its use could spread disease or contamination.	MoEPP Ministry of Health
7. Instruction for the handling of medical waste (1995)	Lays down the types of medical waste and how they should be handled.	Ministry of Health
8. Decree on emissions from waste incinerators into the air (1994)	Lays down special requirements for the incineration of waste regarding their emission of air pollutants and the type of waste that can be incinerated. Aims to cut air pollution.	MoEPP
9. Decree on emissions from stoves and burners (1994)	Lays down the requirements for air emissions from stoves and burners, also stipulates which types of waste can be burnt in stoves and burners and in which conditions.	MoEPP
10. Regulation on the manufacture of and trade in pesticides (phytopharmaceuticals) (1995)	Lays down conditions that manufacturers and traders in pesticides should comply with regarding the equipment, installations, staff, record-keeping, marketing. Manufacturers must be able to destroy safely the waste and packaging of their products.	Ministry of Agriculture, Forestry and Food
11. Regulation of the standards for the storage and transport of dangerous and harmful substances (1979)	Lays down to standards for the equipment and installations for the storage and transport of dangerous goods, also stipulated procedures for their storage.	Ministries concerned
12. Decree on the import and export regime for specific merchandise (1995)	Lays down the regime for the import and export of specific merchandise, including waste materials.	MoEPP Finance Ministry
13. Decree on the areas from which animal waste must be removed regularly (1978)	Specifies the areas from which animal waste must be removed regularly and designates those responsible for this removal.	Ministry of Agriculture, Forestry and Food
14. Statute on the handling, collecting, transporting and processing of animal waste (1981).	Lays down the conditions for the handling, collecting transporting and processing of animal waste.	Ministry of Agriculture, Forestry and Food MoEPP

Source: MoEPP, 1996.

Processing, Storing, Final Disposal and Releases of Radioactive Waste into the Environment of 1986. Based on the Act, Slovenia is able to respect all relevant international agreements concerning the shipment of radioactive waste.

The 1984 Act placed the policy and inspectorate responsibility for non-nuclear radioactive waste including uranium tailings with the Ministry of Health, and for nuclear radioactive waste with the Nuclear Safety Administration, which is now under the political responsibility of MoEPP.

The handling and storage of nuclear and radioactive waste remains in limbo in both physical and policy terms. There is no long-term policy. The radioactive waste stored at NPP Krško is managed by the NPP. That stored at the Low and Intermediate Level Radioactive Waste Interim Storage in Podgorica is at present managed by the "Jo ef Stefan" Institute, but the responsibility may be taken over in future by the newly established Agency for Radioactive Waste Management.

The first general policy document defining the duties of the Agency for Radioactive Waste Management was adopted by Parliament in 1990. The Guidelines for Low and Intermediate Level Radioactive Waste Repository Site Selection in Slovenia were approved. The primary task of the Agency is to find a site and to construct the repository for low and intermediate level radioactive waste, and to prepare the expert basis for the decision to be made concerning the management of the spent fuel elements in the future. The site selection carried out in 1991-93 was interrupted because of strong public opposition.

The Law on financing the decommissioning of NPP Krško and the disposal of nuclear wastes (1994) provides that funds will be collected through special additional charges, assessed to be Slt 0.61 per kWh, added to the rates for the electricity generated in the NPP Krško.

6.3 New waste management strategy

Status

The Government approved the 1995 Environmental Report on 11 January 1996 for submission to Parliament. It confirms that:

- The situation regarding waste management is critical;
- Waste management is a fundamental environmental problem;
- Solving waste problems is a priority.

Accordingly, the MoEPP drafted the "Strategic Guidelines on Waste Management for the Republic of Slovenia". The draft was endorsed by the Government in 1996. It is currently before Parliament for discussion.

The "Strategic Guidelines" are a comprehensive programme document that determines basic guidelines and goals for waste management, prioritizes available waste management options in the light of current conditions, explores possibilities for promoting economic development in an export-oriented economy, and for furthering Slovene integration into the European Union. It also determines actions for the realization of goals, delegates the management of activities, and stipulates deadlines, required investments, and a development scenario for meeting all goals and guidelines by the years 2000 and 2010. The Strategic Guidelines do not address the issue of radioactive waste management.

Pre-accession to the European Union and national development strategies for economic, energy and farming sectors form the strategic framework for the waste management strategy. The general objective of the EU waste management strategy is a rational and environmentally friendly exploitation of natural resources. The main characteristics of an efficient waste management system are a complex of measures to promote and enable the prevention of the generation of wastes at the source, separated collection, reuse or recycling, as well as safe and environmentally acceptable treatment of wastes. In the final treatment of wastes, thermal treatment (incineration) of wastes with energy recovery is preferred to landfilling. The use of the mass content and the use of the energy content have been receiving equal attention recently. The 5th Agenda of the EU, the programmes of the member States, and the regulations adopted in the EU, put the strategic plans into operation and fix the goals.

The annual per capita generation of household waste is below the EU target level of 300 kg. It corresponds to the 'best performing' EU member countries in

terms of this indicator. The Slovene commercial sector will adjust, at the latest in five years, to the EU directives regarding waste management, especially with respect to the responsibility for discarded products.

Basic principles

The following basic principles have been adopted in the Strategic Guidelines on Waste Management:

- Solving the problems of waste at the source;
- Preventing the generation of waste during production and consumption rather than applying measures to waste flows at later stages;
- Sorting waste by material at the source of generation prior to collection;
- Principle of 'restoration to nature' (i.e. putting waste biomass into the ground);
- Installing an economically rational network of waste management facilities and installations;
- Rational space management, and preservation of the natural and cultural heritage;
- 'Inertize' deposited wastes and remedy illegal landfills and old burdens.

Goals and targets

The main objectives are:

- Reducing and limiting all possible adverse impact of waste management on the environment and human health;
- Decreasing the quantity of wastes through measures reducing their generation and measures establishing rational use of waste mass and energy contents;
- Decreasing the hazard potential of used and obsolete products and generated wastes;
- Inertizing waste and immobilizing hazardous substances in wastes prior to their landfilling;
- Improving the quality of waste management.

Up to the year 2000, the technical measures that will limit inconveniences linked to the presence of wastes are a priority. For example, there is a risk that, without effective measures to minimize and use the mass and energy contents of wastes, all the present waste landfills in the country will be filled up within 5 to 7 years. The relevant target values of the Strategic Guidelines are set out in table 6.4.

Up to the year 2000, the quantities of wastes will be cut mainly by:

- Separately collecting and processing organic and green wastes (10 to 15 %);
- Separately collecting and using waste paper (5 to 7%);
- Separately collecting and using waste glass (3 to 5%);
- Recycling discarded vehicles (collecting 50% of vehicles, gathering 85% of secondary materials for reuse).

The existing landfills will be filled up more slowly mainly by recycling more glass, separately collecting plastic, and separately collecting, intermediately storing and partially dismantling bulky wastes, discarded vehicles, and construction waste.

Besides separately collecting most hazardous substances, dumped domestic waste will be cut mainly by completing one incineration plant, and bringing on stream another by the end of the century.

The major target with regard to farming is to decrease liquid effluents from larger farms 40 - 50% in volume by 2000, and to use them in agricultural areas.

To achieve the set goals, the cost of waste management will be at least 1% of the gross national product (GNP) in the period up to the year 2000. This implies an average annual investment of Slt 16 billion, of which two thirds will have to be secured from public funds.

Economic instruments

Economic incentives for environmentally rational waste management will supplement direct legislation and other measures to reach the goals and targets. The introduction of such incentives will have priority where their administrative costs prove relatively low, where there is a multi-party interest in developing or expanding the market, where the participants are clearly defined, where the achievement of environmental goals is monitored, and where the probability of efficient sanctioning is high. The main financial mechanisms to be implemented are:

- Charges for waste dumping;
- Fees for public environmental services;

- Charges on products (excise duties), depending on the contents of recycled materials;
- Administrative taxes for services performed by the State;
- Obligatory collateral by polluters as a guarantee against pollution;
- Liability insurance;
- Deposits from potential polluters;
- Soft loans for cleaner technologies, for instance;
- Guarantees for infrastructural facilities promising long-term system solutions;
- Long-term reserves.

Responsible institutions

Based on the adopted strategic plans, the State Government develops operational programmes, establishes the legislative framework and promotes mechanisms for waste handling and management. It establishes an information and monitoring system, secures an earmarked cycle of funds within the implementation of waste management programmes, provides additional funds, and promotes the efforts of local communities to work together to solve their waste management problems.

The MoEPP is foreseen as the coordinator of the ministries involved in waste management. Their tasks are to:

- Establish a coordination body within the Government;
- Overhaul certain harmful industrial technologies and products;
- Promote new, less waste generating production, processing and transport facilities;
- Formulate and implementing criteria and conditions, for sectoral strategic groups, aimed at reducing the quantity and hazard potential of wastes;
- Incorporate small businesses and dispersed production and trade activities into the waste management programmes;
- Promote national facilities to secure the use of the mass and energy content of wastes;
- Develop incentives for the introduction of ISO 9000 and ISO 14000 series;
- Prevent the import of products and technologies representing long-term environmental risks;
- Specify financial mechanisms for the control of waste flows;
- Develop a pricing system for commercial waste management services;
- Formulate a policy for farmers to observe the priority of returning biomass to the ground;
- Incorporate waste-related issues into the education curricula;
- Control the application of binding international conventions.

Local authorities adopt operational programmes and ordinances on waste management for their areas, in line with the State strategic plans and the operational programme on waste management. They ensure the collection, removal and final disposal of solid domestic waste, wastes arising from the purification of municipal waste water, and night-soils sediments.

6.4 Conclusions and recommendations

Conclusions regarding the waste strategy

The MoEPP considers waste generation and management to be major problems. The EPA sets the legal framework for general waste management, emphasizing principles and listing regulations and similar legal instruments for implementation. The regulations and other instruments have not yet been

Table 6.4: Projected targets for the reduction of landfilling by type of waste, 2000 and 2010

Type of waste	Reduction of landfill (% of 1995) 2000	2010	Positive effects/requirements
Municipal waste	25 - 55	40 - 80	Utilization of mass and energy content of wastes, partial reuse of biomass, decrease of hazard potential by separation of wastes containing hazardous substances
Construction waste	30 - 60	45 - 85	Utilization of mass content
Mining and manufacturing waste	30 - 60	45 - 75	Decrease of quantities and hazard potential; utilisation of mass and energy content
Energy waste	10 - 40	15 - 45	Utilization of mass content in construction and mining
Agricultural, food and forestry waste [dry matter]	0 - 25	100% of biomass	Decrease of the quantities of liquid effluents in livestock breeding

Source: Draft Strategic Guidelines on Waste Management Strategy, MoEPP, 1996.

enacted. Consequently, legal instruments from before independence remain applicable. However, from both a substantive point of view and because of the changes that have occurred in the social and political system, they cannot always be enforced. This complicates the implementation of the legislated policies, as it introduces a large element of judgement into management.

The development of a comprehensive and detailed waste management strategy is nearing completion. The "Strategic Guidelines" are well designed from the point of view of pre-accession to the EU, a national priority. They are also well designed technically, and very complete in their long-term goals, although they exclude the issue of radioactive waste, which is dealt with elsewhere. Once fully implemented, the waste strategy will open the way for a successful solution of most problems encountered in this area. The strategy will also facilitate - and thereby accelerate - the overdue development of the implementing ordinances that are required by the EPA.

The main operational principles underlying the "Strategic Guidelines" favour the prevention of waste problems at their source, and material separation of wastes, whenever possible, to facilitate recycling and reuse. Regarding the final treatment of waste, landfill disposal is considered the least acceptable option. In particular, the construction of landfill and bigger composting plants for municipal waste requires new areas and would lead to land use controversies. Therefore, Slovenia has chosen to stop landfilling untreated waste with an organic carbon content above 5% by 2010. Meeting this objective requires a reduction in waste volumes through the separation of waste by material at the source of generation, followed by recycling, or incineration.

Each of these actions is problematic. Separating waste materials at the source cannot easily be turned into a practicable solution in the short term, particularly not in the case of municipal waste. Present recycling capacities either do not exist, or are insufficient. Building incinerators is costly and leads to problems of siting and public acceptance, which are not fully addressed in the strategy. Yet, incineration appears to be the most promising option in terms of the strategic goals in the near future.

The success of the new waste management strategy therefore critically depends on the first incinerator with a capacity of 200,000 tonnes/year being operational in the year 2000 or 2001. A second one, with a higher capacity, could be brought on stream in the first decade of the next century. Thus, considerable investments are needed in the near future. While the strategy is realistic about the related funding requirements, it is silent about the sources of funding. This aspect is particularly complicated, as the level of charges for municipal services have for a number of years been blocked for social reasons. They are generally much lower than in the EU member countries. The issue of waste taxation should be approached in the context of a comprehensive structure of environmental taxation.

Potential locations for thermal treatment plants (incinerators) are the industrial zone of Kidričevo and the environs of Ljubljana, where the siting is endorsed by the local authorities. The reaction of the local population is as yet not fully known. Regulations concerning emissions from incinerators have already been established. The design of the planned incinerators will allow reuse of the energy contents of incinerated waste for heating purposes and electricity generation.

Another bottleneck in the strategy may be the limited availability of adequate human resources for its implementation, both at the level of Government and in the various institutions involved (industry, consultants, universities). The resource requirements in terms of manpower and qualifications are not established.

The current prevailing method of waste treatment and disposal is dumping at more or less regulated tips. Even if an incinerator becomes available within 3 to 5 years, it is still necessary to boost the landfill disposal capacity. Thus, a regulatory framework for siting, building, operating and decommissioning municipal landfills for domestic waste in accordance with modern control standards remains a top priority.

The amount of generated industrial waste, and in particular hazardous waste, is poorly described. There is a need for a uniform methodology and regulatory requirements for collecting data to establish and maintain a reliable inventory of hazardous wastes and their movements.

The Slovene development strategies imply a growing amount of wastes from farming, forestry and food processing. The waste problems, especially that of liquid manure, remain unsolved. Safe final treatment of the residues of plant protective substances, together with their contaminated packaging, is feasible, but only if supported by a suitable organization.

Conclusions regarding radioactive wastes

New legislation on protection against radiation is under preparation. It is not clear yet whether it will incorporate the issue of nuclear fuel cycle management. The EPA requires a State public service for managing nuclear waste.

The draft document "Strategies for decommissioning NPP Krško and waste management" implies that a decision on long-term fuel management is deferred. A decision on whether to reprocess the spent fuel or to dispose of it in a final repository has been postponed for several decades. In the meantime, problems related to spent fuel management will be managed by using or eventually expanding existing storage capacities and providing additional capacities for intermediate storage. The expected lifetime of the NPP Krško is until 2023. However, final disposal solutions should be found much earlier, probably around the year 2005 or 2006.

The storage site at the research reactor TRIGA Mark II functions properly from the technical point of view, but it should be organized on a proper legal basis and have a well-defined tariff structure for users.

The present situation of both disposal sites at the decommissioned Žirovski Vrh uranium mine needs to be remedied, possibly as part of the decommissioning of the mine tailings. There are essentially two options: (i) transfer the waste back into the mine, or (ii) stabilize the waste and leave it on the spot. Both options have environmental and radiological disadvantages. The optimal decommissioning of the mine tailings in accordance with internationally accepted standards should be the technical and policy priority in the medium term.

Conclusions regarding recycling and reuse

By adopting the EPA, Slovenia lost the legal foundation for operating a waste exchange market. In spite of traditions in the use of secondary raw materials, reuse and recycling of waste are diminishing, mainly owing to the lack of appropriate economic measures. For example, the application of subsidies for pilot projects and of tax relief for process technologies and types of residual materials could help to increase the reuse of secondary waste materials. An asset to the further development of reuse and recycling is the apparent success of the Waste Exchange. The functioning of this market should therefore be strengthened.

Increasing the use of recycling in the construction sector, and the composting of agricultural and similar wastes could be of particular value to the success of the waste management strategy. The foreseen expansion of construction activities and, hence, waste generation, as well as the supply of other waste materials (primarily gypsum) suitable for reuse as construction material, will require regulatory specifications and economic incentives to ensure their maximum reuse.

Large-scale composting of organic wastes, including municipal wastes, is an essential ingredient of the Strategy Guidelines. It requires the development of a market for compost as a supplementary measure.

Until recently, the export of waste was licensed and supervised according to the terms of the Statute on the Handling of Special Waste Containing Dangerous Substances (1986). However, the supervision of exports had been rather lax. By ratifying the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Slovenia has accepted obligations regarding international waste traffic. It began meeting these obligations in 1996 by adopting the related regulation.

The principal responsibility for the licensing of transboundary movements is with the MoEPP, whereas the operational control is the task of the customs inspectors, who may request the professional assistance of the Environment Inspectorate. The licensing and inspecting authorities need to develop and maintain in this context a high level of relevant expertise, which is not yet readily available (see also chapter 2).

Recommendations

Recommendation 6.1:
The legal instruments required for the implementation of the "Strategic Guidelines on Waste Management for the Republic of Slovenia" need to be enacted as soon as possible. Top priority should be given to economic and technical issues of hazardous waste management, separation of wastes at the source, waste reduction, and management of wastes in the farming sector.

Recommendation 6.2:

A plan for funding the measures foreseen in the waste strategy should be adopted, including specification of sources of funds, concessions and levels of charges for public waste management services.

Recommendation 6.3:

The number and qualifications of human resources required to implement the waste management strategy should be assessed for both public administrations and industry.

Recommendation 6.4:

The public acceptance of the location of waste incinerators should be solved through the application of the EIA procedure.

Recommendation 6.5:

There is an urgent need to establish a regulatory framework for the location, construction, operation - including monitoring and restoration of existing municipal landfill sites - and decommissioning of municipal landfills for domestic waste, to cope with inadequacies of the present ones and the imminent development of new ones. The regulatory framework should also address the problems with illegal dumping sites. *(See also Recommendation 3.3)*

Recommendation 6.6:

An adopted plan for the remediation of the storage sites of uranium mine tailings at Zirovski Vrh should be implemented, using the EIA procedure.

Recommendation 6.7:

The markets for recycled wastes that are suitable for use should be developed, relying at least initially on the existing Waste Exchange.

Recommendation 6.8:

The installation of composting capacities should be accompanied by measures to develop the market for compost. *(See also Recommendation 2.5)*

Chapter 7

NATURE CONSERVATION, FOREST AND BIODIVERSITY MANAGEMENT

7.1 Current state of nature

Habitats

Slovenia's landscape is mostly hilly and mountainous. Lowlands, valleys and basins represent only 18% of the territory. The more than 900 different types of soils and about 50 kinds of rock types, combined with various climatic belts (see Introduction), explain the very high number of diverse and specific ecosystems and biotopes. There are still virgin natural areas left in Slovenia. It is estimated that roughly 60% of the environment is natural or semi-natural, including landscapes and areas which in the past were traditionally managed and where activities have long been abandoned. Although forests stabilize the slopes and valleys, erosion is endangering 44% of the Slovene territory.

As much as 44% of the territory is karstic, with an extensive underground system of caves and rivers. Located in the west and in the Alpine region, karstic landscape appears in limestone and dolomite (respectively 35% and 8% of Slovenia's land). 6662 underground caves, of which 73 are protected, have been registered with the Slovene Speleology Association. The Škocjanske Jame, which is the largest underground Slovene cave system, has been listed as a World Natural Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO) since 1986.

Biodiversity

Slovenia's relatively small territory shelters a rich biological diversity. Such biodiversity is mainly due to the above-mentioned convergence of different types of climate, geological structures and great differences in altitude. A survey in 1995 (table 7.1) showed that about 3,000 higher plant species grow in Slovenia, of which 70 Alpine species are endemic or were recorded for the first time in Slovenia. Common European animal species such as wild boar *Sus scrofa*, fallow-deer *Cervus dama*, chamois *Rupicapra tragus* are numerous; so are rarer species such as brown bear *Ursus arctos* and lynx *Felis lynx*. The hunting of all of them is authorized. There are also less common species: heather turtle, cave hedgehog, scarabaeid and various species of dormice. 361 bird species have been recorded in Slovenia, 219 breed there. 170 flora and fauna species live exclusively in underground waters (stygobian species).

According to the Dobris Assessment, except for fish and vascular plant species, the rate of threatened species is higher than in the rest of Europe: only 11% of the 3175 higher plants and 40% of freshwater fish are in danger, but as many as 55% of the bird species, 62% of the mammals, 82% of the reptiles and 91% of the amphibians. Freshwater and wet ecosystems are more threatened than grass and coastal ecosystems.

A number of foreign species were introduced illegally, in particular rainbow trout in freshwaters during the first world war. As a result, many of the native species have disappeared, others are under threat (e.g. amphibians). For this reason, shrimp imports are currently prohibited. Mammal species, such as moufflons *Ovis musimon* and wild goats *Capra hircus*, have also been introduced, and they, too, are competing with indigenous species.

The underground environment offers suitable and very specific conditions for the development of endemism. 300 species are found in the karstic caves, of which two are found only in Slovenia. Among the best known are a fish, the *Salmo Soča*, and an amphibian, *Proteus anguinus*. The main risk to endemic karstic fauna is the chemical pollution of aquifers by agriculture, industry, and urban sources of pollution and waste.

Table 7.1: Number of species by group in Slovenia

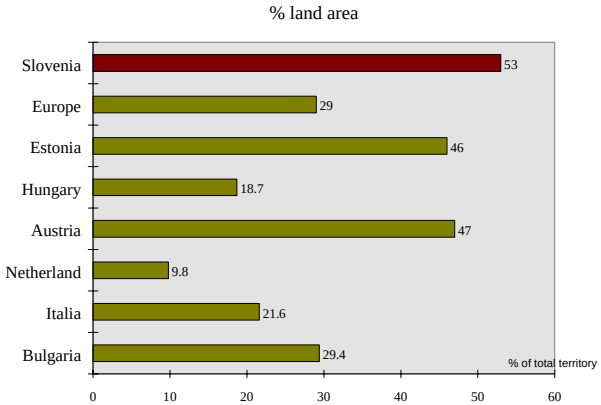
	1992		1995
	Number of species	Number of endangered, vulnerable and rare species	Number of species
Mammals	69	30	76
Birds	207	74	361
Reptiles	27	19	23
Amphibians	22	18	21
Freshwater fish	98	31	204
Invertebrates			10 000
Vascular plants*		300	3 175
Mosses		203	750
Fungi			3 000
Lichens **		70	600

* 1985 data; ** 1988 data.
Source: IEDS database.

Forest

About 53% of Slovenia's territory is covered with forest, ranking the country among the most forested in Europe (see fig. 7.1). Beech trees represent about 55% of the forests, pure conifer forests 9% and pure deciduous forests 17%. Most of the forests are mixed forests, 55% of them dominated by deciduous trees and 45% by conifers. Forest cover has increased by more than 15% in the last century due to a decrease in the area used by agriculture, and is still expanding (table 7.2). Only about 15% of the forests have suffered a significant change in their natural composition (dominance of the Norway spruce) due to the introduction of new foreign commercial tree species. All other forests can be considered to be semi-native habitats. Real virgin forests, which have never been exploited, are rare and cover only some hundred hectares.

Figure 7.1: Forest area in Slovenia and other European countries , 1996



Source: State of the World's Forest 1997, FAO.

Table 7.2: Forest resources, 1980-1994

	1980	1990	1994
Forest area (in thousand ha)	1 027	1 077	1 094
Protected forest area (in thousand ha)	5.7		104
Growing stock (million m^3)	194	207	220
Removals (thousand m^3/year)	3 141	2 435	2 255
Annual gross increment (thousand m^3/year)	4 931	5 301	5 645
Area covered with forests (%)	51.6	53.2	53.5

Source: 1995 Statistical Yearbook of the Republic of Slovenia.

In some areas, there is a considerable difference between the current tree species composition and the natural composition. This has made the forest more susceptible to damage by different agents. Bark beetles pose serious problems in dry and warm years and in dense spruce forests. There were 15,670 affected plot samples in 1993 covering 1,800 ha in all, and more than 9,000 in 1994 covering 917 ha, which means 1 affected area per 100 ha of woodland on average. The game population (see fig. 7.3), which exceeds the overall capacity of forests, is gnawing and peeling young trees.

Time series since 1985 show that 20-25% of trees, mostly coniferous trees (fir and spruce) and oak trees, are suffering from defoliation. This is partly the result of air pollution, in particular from sulphur, which makes the trees more vulnerable to biotic and abiotic agents and diseases. In addition to acid rain, thermal power plants emit acidifying solid particles. However, the monitoring grid of 4 km x 4 km is too sparse to determine in which forests the trees are the most damaged and by what specific factor.

Currently about 70% of the forests are privately owned. The privatization of forests is leading to a great number of small forest properties (about 300,000), which makes it more difficult to protect them.

Wetlands

Like elsewhere, the wetlands are among the most endangered ecosystems in Slovenia. Twenty-two of them are already protected as important sites for endangered or rare species of wild flora and fauna. The share of inland wetlands and ponds is significant in the main river systems, where the main threat is the construction of hydrological and engineering structures that are detrimental to their ecological and environmental integrity. Today the overall wetlands surface is decreasing, in particular in the coastal area, because they are filled in, or drained and used for construction. Slovenia has currently only one site on the List of Wetlands of International Importance (Sečoveljske Soline), although, according to IUCN, 6 were recorded in 1965 covering 89,673 ha. In accordance with the Kushiro Resolution of the Ramsar Convention, a management plan is being drafted for the listed Ramsar site and a small group of experts has recently been set up (see chapter 2). A national wetland strategy is also being drafted.

Coastal area

The 47 km long Adriatic coast is under severe pressure from tourism and infrastructure development. Salt-pans, flysch cliffs and solitary lime rocks are important littoral ecosystems in terms of biodiversity. There are two protected areas on the Slovene coast, the Sečovlje salt-pans being the most important. The Slovene coastal area is for most of its length a very narrow belt with no possibilities for inland expansion. At the same time the development of a preferential east-west transport corridor as part of the European strategy on transport will increase the pressure on the coast from infrastructure development like ports and airports, as well as tourism. Aware of these problems, Slovenia has recently (1997) developed an integrated coastal management programme (see chapter 2). It also participates actively in the implementation of the Protocol on Specially Protected Areas under the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.

Protected areas

Slovenia has relatively few protected areas and only one national park. They cover about 8% of the territory, and are often transboundary (table 7.3). For instance, the Triglav National Park (84,805 ha), which covers 4.5% of the national territory, borders Italy and Austria on some hundred kilometres.

A network of strictly protected forest reserves has been established. They represent 1% of the forest

Table 7.3: State of protected areas in Slovenia

Designation	Number	Area (ha)	IUCN categories
National park	1	84 805	II/V
Landscape park	31	34 509	V
Others protected areas similar to landscape parks	3	2 360	V
Nature reserves	34	incomplete data	I
Nature monuments	720	..	III

Source: Nature Protection Authority of the Republic of Slovenia, MoEPP, 1995.

area (60,000 ha). Some of them are virgin forests untouched for more than one hundred years. Another 6% of the forests are protected forests which have remained practically untouched. Protected forests or forests classified as natural heritage will not be returned to private owners, who will be offered another plot in exchange or compensation.

7.2 Pressures on nature

Industrial and human activities

The Slovene industries are exerting strong pressure on nature (see chapter 9). Industry as a whole contributes up to 60% of the toxic substance pollution, is responsible for 80% of the hazardous wastes generated, and produces 55% of the sewage. Mostly concentrated in valleys along the rivers, the industrial complexes have caused high pollution in some places. For instance, in Jesenice, pollution from heavy metals is very high. The energy generating industry has noticeable adverse impacts: thermal power plants are endangering forest health through air pollution; the regulation of rivers by dams and the multiplication of small hydroelectric power plants, especially in the Alpine region, are destroying natural watercourses; and although there is no record of radioactive pollution by the Krško nuclear plant, the cooling system is responsible for a 3°C increase in the temperature of the Sava river, which is upsetting the ecosystem's balance.

Moreover, industries are usually located in, or close to, urban settlements, which add to the pressure on nature. The building of new individual housing, 30-40% of which non-authorized, increases the pressure on land use and natural assets (see chapter 3). More than 694 karstic caves were illegally used as waste deposits (chapter 6), 58 of them are still active landfills and another 57 are filled with waste. On the whole, the damage is alarming and not only destroys natural sites but also threatens karstic waters (figures 7.2 (a) and (b)).

Agriculture

In Slovenia, almost 40% of the territory is agricultural land, of which 12.1% is arable land. The main impact of intensive agriculture has been pollution due to excessive application of fertilizer and pesticide on soils and their leaching into fresh and groundwaters. Agriculture contributes up to 50% to the eutrophication process and 15% to pollution from toxic substances, which both affect ecosystems. Furthermore, the landscape is modified in areas of intensive agricultural land use. Crops, irrigation, stream regulation to prevent floods, and cattle breeding, all put pressure on natural habitats, flora and fauna, thus modifying their equilibrium and diminishing biodiversity (see chapter 10).

In the future, because of Slovenia's desire to become self-sufficient in agricultural produce, there is a danger that intensive agricultural production will increase. Felling of solitary trees and bushes and land consolidation (i.e. merging of individual plots) in favour of "agromelioration" operations are already deeply modifying the landscape in some places. In many cases, the natural equilibrium is thus modified and biotopes are destroyed. To mitigate the effects of agriculture on nature in the Alpine part of the country, Slovenia has ratified the Protocol on Agricultural Practices under the International Convention for the Protection of the Alps.

Forestry and forest resource management

The forest is of vital economic importance, as Slovenia does not have many other natural resources. Its management is directed towards the production of high-quality wood, an essential basis for the

Figure 7.2 (a): Caves registered in the Slovene Cave Cadastre

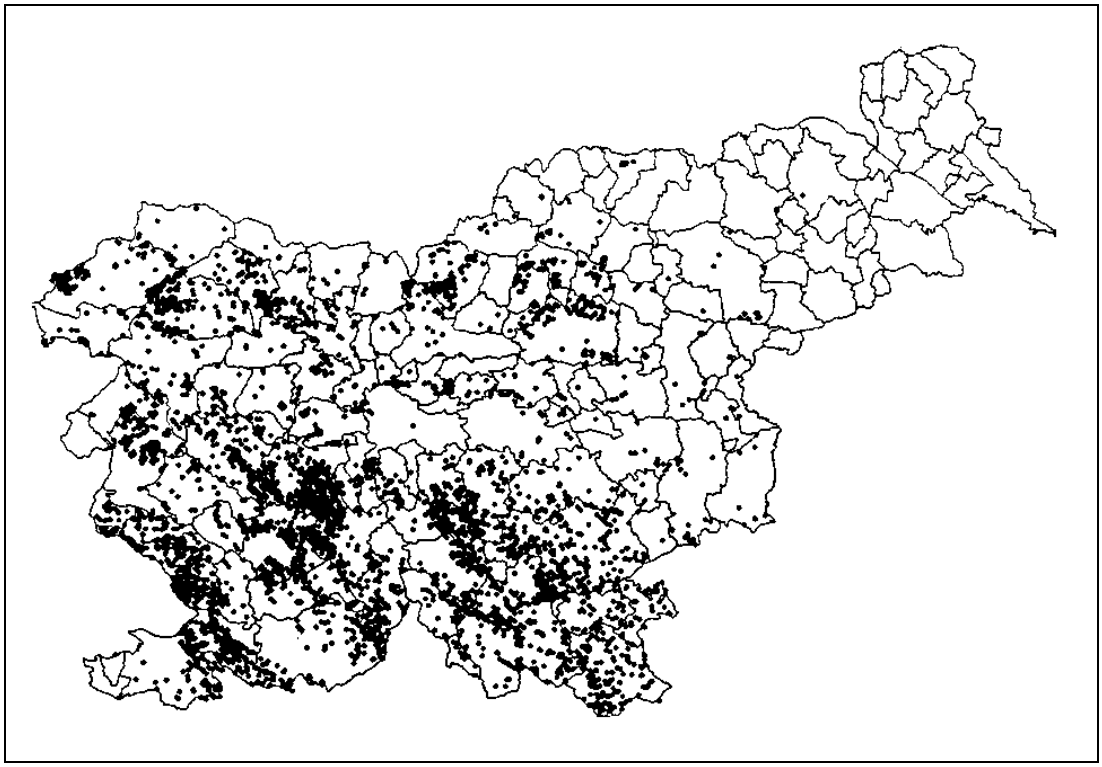
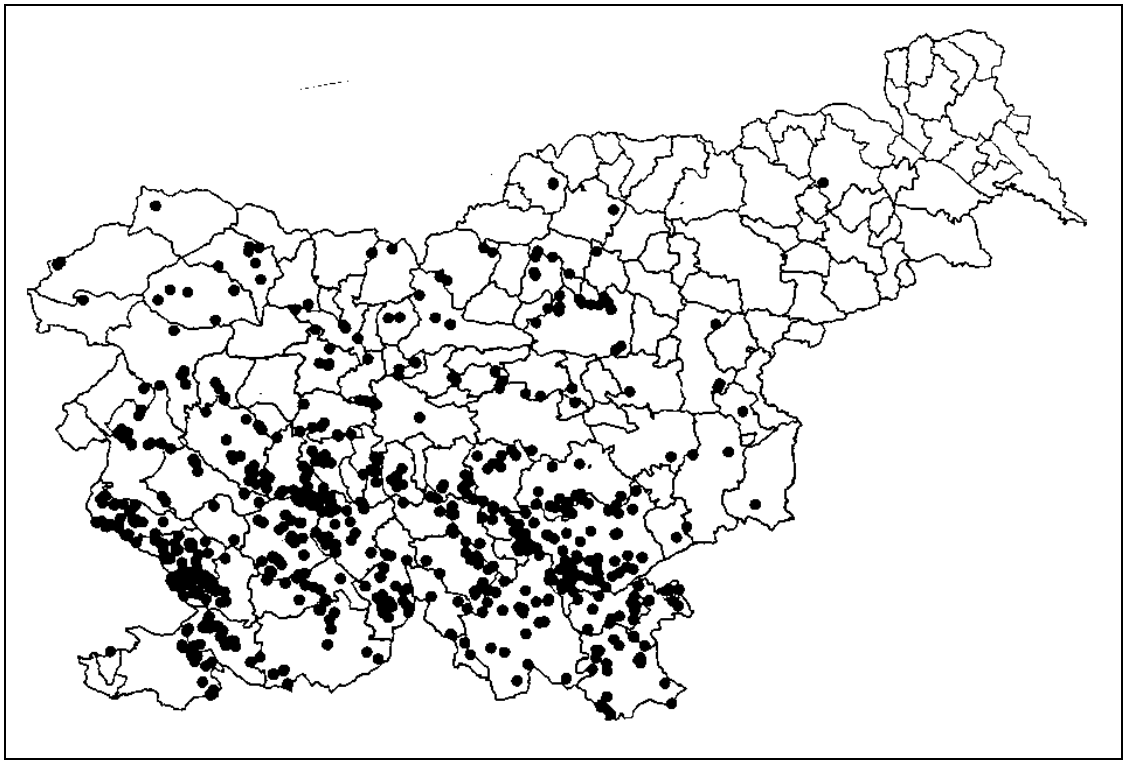


Figure 7.2 (b): Polluted and damaged caves according to the Slovene Cave Cadastre



Source: Ministry of the Environment and Physical Planning.

development of the wood industry. Slovene forests are in better condition than those in other European countries, with a more diverse natural structure, thanks to well-planned and careful management in the past. Nevertheless, compared to the 70s and 80s, the care for forests has deteriorated in the past few years. Since 1990, 20 to 30% of timber removals in Slovenia have been voluntary sanitary fellings of trees affected by biotic or abiotic diseases. Ecological monitoring around the Šoštanj thermal power plant has shown that tree health has improved since the air desulphurization plant came on stream and air pollution decreased (see chapter 4).

Over the past four years, monocultural tree management has been practised. However, this has weakened forests. These practices have been discontinued under the new Forest Development Programme. Attempts have also been made to regenerate forests with indigenous tree species. The current volume of the growing stock (208 m^3/ha) is considerably higher than the EU average (134 m^3/ha for EU_{12} and 107 m^3/ha for Nordic countries). Forests have not yet attained their optimal age and diameter structure. Young stands represent 11% of forest area. Pole stands are over-represented (45%), whereas mature stands (23%) and, above all, older stands (6%) and selective stands (3%) are under-represented.

Frequent fires also jeopardize forests during summertime in the dry sub-Mediterranean part of the country (table 7.4). It seems that fire protection measures imposed on municipalities for the protection of human settlements, if they exist at all, are not implemented, and that forest owners do not respect their obligation to maintain their forest plots so as to limit the extent of possible fires.

Table 7.4: Number of fires and fire sites in the Slovene sub-Mediterranean region

Year	1991	1992	1993	1994
Number	66	113	211	68
Damaged surface area (ha)	713	530	1863	913

Source: 1995 Environmental report of Slovenia.

Hunting

Wild animals are numerous in Slovenia. Hunting and fishing are popular traditions open to all citizens. The evolution of the population is monitored, and data entered into a database. The annual shooting and evolution of the population of roe, red and fallow deer, moufflon, chamois and boar are recorded (fig. 7.3).

Transport infrastructure

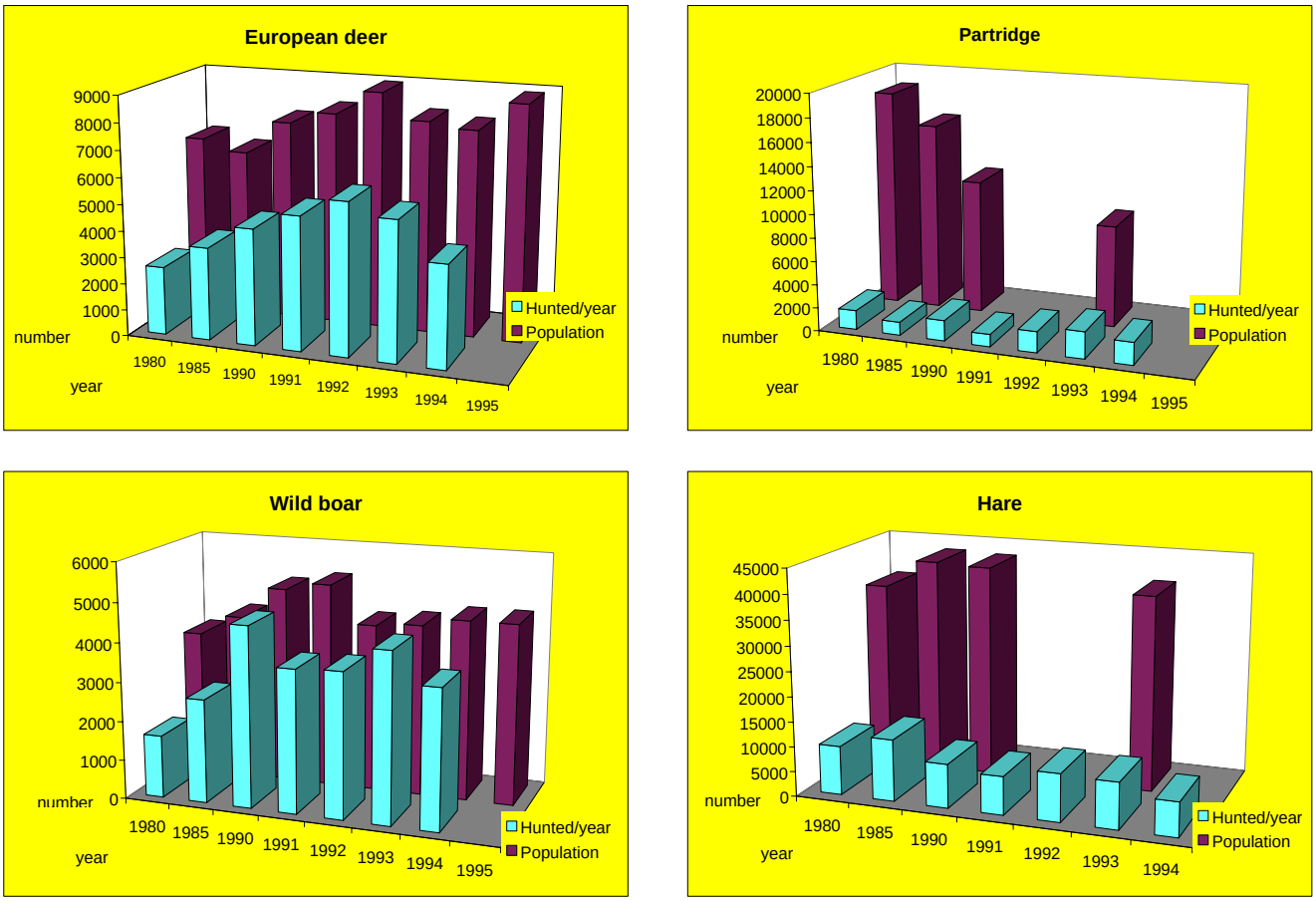
The development of the highway infrastructure (see chapters 3 and 12) jeopardizes the continuity of the ecological corridors by cutting through the natural areas. The decision to build the east-west highway was made at a time when EIA and vulnerability studies were not compulsory. As a result, the Nature Protection Authority had only little influence on the road's tracing, although it did obtain some special facilities such as tunnels or viaducts so that animals can cross. Currently, the design of a highway to the coast is a hot topic for debate because of the many conflicting interests involved. However, vulnerability studies and EIA regulations are now in place.

Tourism

Nature is the most obvious tourist attraction. There is both summer and winter tourism. Slovenia inherited a well developed tourist industry. At present, it is trying to focus on individual rather than mass tourism. The Triglav National Park of 85,000 ha has a population of 2,000 but receives 2 million visitors a year. Some famous karstic caves (Postojna and Škocjanske) also receive many visitors.

Tourism development is also threatening nature conservation in other places, such as the Soca river and the Adriatic coast by uncontrolled rafting, canoeing and kayaking. Day-trips are very popular, for instance during the ski season in the Alps. At the same time, skiing exerts seasonal pressure on nature.

Figure 7.3: Population of selected hunted species and number killed per year



Source: IEDS database.

7.3 Nature conservation policy and management

Legal instruments

The Natural and Cultural Heritage Act passed in 1981 is still in force. However, the Act falls short in some aspects such as species protection, habitat conservation, trade control mechanisms and incentives, which are poorly defined. Since the Act gave responsibilities to local authorities, few regulations were issued at the national level before 1984. Until 1993, local ad hoc solutions were used to bridge the gaps and no proper feed-back control system existed between local and central authorities. In an attempt to remedy this situation, red lists of endangered species were drawn up (of vascular plants, 1989; lichens, 1989; mosses, 1992). Subsequently, the Decree on the Protection of Threatened Animal Species (1993) and the Decree on the Protection of Threatened Fungi (1994) were passed. Another decree from 1996 protects 28 vascular plants. In late 1996 a law for the protection of the Škocjan cave was also adopted. However, this does not adequately address the current problem, neither does it provide sufficient guarantees against the pressure exerted by land ownership changes. The Natural and Cultural Heritage Act does not contain any provisions for compensating owners for the restrictions resulting from the protection regime. Nature conservation legislation cannot fully ensure the protection of birds and habitats. A new conservation act is being drafted which will mitigate the effects on habitat and species protection outside and inside protected areas, and strengthen the management of protected areas. It will be in line with EU legislation and the Naturopa 2000 process. In 1993 the new Act on Forests came into force.

Strategies

In 1993, work was started on a nature conservation strategy as a basis for future policy and objectives. The conservation strategy is a long-term strategy encompassing international, national and local objectives. It will address biodiversity issues throughout. It will act as a model for legislation, focusing on organization and management, setting up a system of protected areas, conserving species and

habitats, and integrating nature conservation principles with other policies. A special national programme is foreseen to implement general strategic biodiversity goals. It is likely that biodiversity and nature protection will be among the first three priorities announced in the upcoming NEAP.

According to the draft of the national conservation strategy (1994), the protected areas are to expand to about 20% of the national territory. The most representative habitats would thus be protected. The strategy foresees the establishment of a network of protected areas and connecting corridors that would compensate for the fragmentation of natural habitats European Ecological Network approach (EECONET).

Complying with ratified international agreements and programmes on nature protection also helps to set objectives (see chapter 2). In contravention of the Convention on Biodiversity, Slovenia has not yet completed its national strategy for biological diversity. However, the implementation of the Protocol on Nature Protection and Landscape Management to the Alps Convention will help protect nature in the Alpine part of the territory, and in the Triglav Park in particular. The draft action plan under the Convention proposes, *inter alia*, to black-list unsustainable projects, set up protected zones in municipalities and ecological bridges between protected areas, and protect endangered predators. As a member of the Council of Europe and IUCN, Slovenia is actively involved in applying the Pan-European Biological and Landscape Diversity Strategy and is taking action to develop east-east cooperation on this issue. The approximation process to the EU will bring about major improvements in nature protection with the implementation of the Conservation of Natural Habitats and of Wild Fauna and Flora Directive. Joining the Naturopa 2000 network will also broaden the scope of nature conservation principles.

In 1996, the National Assembly adopted a national strategy for sustainable forest management, which covers the protection of forests. The subsequent Forest Development Programme (1996) acknowledges the Helsinki Resolutions of the Ministerial Conference on the Protection of Forests in Europe (1993) as one of the most important international commitments. It identifies sustainable management with regard to biological diversity and all other ecological, social and production functions of forests as the primary goal. It sets guidelines, which are incorporated into forest management plans. Such plans are set up for all forests, irrespective of their ownership.

Since all forests are managed according to management plans and guidelines, a balance between growth and removals is ensured (table 7.2). For the decade 1991-2000, only 57% of the growth will be cut. The process of forest privatization has recently been postponed for a second time. Currently private owners possess 70% of the forests and are free to exploit their plots. Fragmentation of the forest is a problem, as today 89% of the owners own less than 5 hectares of forests, 55% less than one hectare. The Ministry of Agriculture has given them guidelines as to how they should manage their forests. Since 1993, it has been prohibited by law to clear some forests, except with a permit issued by the forestry authorities. Any decisions concerning forests are based on land-use plans established by the Slovene Forestry Service and adopted in a procedure in which all the stakeholders can express their opinion. In order to improve the maintenance of forests, silvicultural activities are subsidized by the State, based on planning by the Forestry Service. So far no service costs are charged to the private forest owners.

To combat disturbances which affect the forest ecosystem, the Forest Development Programme aims at increasing the growing stock and, consequently, the age and size of trees. This will improve the general protection functions of the forests and their resistance to disturbances. The Programme also favours the introduction of more tree species, mimicking natural forest structures, which is another way of strengthening forest resistance. Among non-wood forest products, mushrooms and game are the most important. A decree limiting mushroom picking has been adopted recently. Hunting is strictly controlled.

Institutions and instruments

Since December 1994, the responsibility for protecting the natural heritage (with the exception of monuments), previously the remit of the Ministry of Culture, has fallen under the MoEPP. Within the Ministry, the Department of Nature Protection in the Nature Protection Authority directs the protection of natural resources, assets and heritage, land, flora and fauna, except forests. At regional and local levels, the

inspectorate of the MoEPP supervises nature protection and carries out ecological checks at the State borders. Seven regional institutes for the protection of natural and cultural heritage, previously with the Ministry of Culture, ensure the link between national and local levels, but have not been reorganized to fulfil adequately their new tasks since coming under the MoEPP.

Some conservation measures are enforced through legislation of other sectors. Monuments are still managed by the Ministry of Culture. The management of forests is the responsibility of the Ministry of Agriculture and its 14 regional offices. 750 employees of the Forestry Service manage forests for public and private owners according to the Forest Act, which is based on the concept of sustainable use of the forest. However, the Forestry Service does not have clear responsibilities for the preparation of biodiversity management plans and species management plans in forest zones.

The Government is responsible for operating and maintaining an information system which covers the status of nature too. For instance, to monitor forest health, crown defoliation is recorded every year according to a 16-kilometre grid, and once every five years according to a 8-km grid. International agreements impose many obligations for reporting nature data, e.g. the Alps Convention, the European Centre for Nature Conservation, the World Conservation Monitoring Centre.

National or regional parks and other areas of outstanding value are designated at the national level, all others at the local level. Communes are responsible for designating natural monuments and nature reserves. Different municipalities apply different criteria, and precise data are not always available. This explains why the official list is currently being reviewed. There are no provisions for specific habitat protection; habitats can be protected as natural heritage or protected areas. For the moment only Triglav National Park and Trebče Memorial Park have their own management authority, no proper management measures are foreseen for any other protected areas. Their protection is based on bans defined in the designation act, which are supposedly controlled through inspections.

The MoEPP has its own plans for establishing a new department of nature conservation, which would be responsible for the administration of protected areas. Such a structure would eventually transfer responsibility for the management of protected areas from the Ministry of Agriculture (Forestry Service) to the MoEPP. This might lead to a better protection of species and biodiversity management in these areas.

Although they have long had an important role in raising public awareness, some NGOs for nature conservation (e.g. Association for Natural Sciences, Slovene Bird Watching and Studying Society, Mycologist Association, Mountain Association) are not influential enough, neither are they financially or organizationally strong enough to take independent action. They mostly organize and conduct scientific campaigns and projects, and educational and training activities. Since May 1993, Slovenia has been a full member of IUCN.

International conventions play a role in defining objectives at the national level and assist in their implementation. Slovenia has ratified agreements which aim at protecting biodiversity, wetlands, the Mediterranean Sea and other specific regional habitats and ecosystems, for instance in the Alpine part of the country. Other conventions could improve the protection of species and biodiversity, but have not yet been ratified (see chapter 2). Currently Slovenia is intensifying its contacts with international organizations dealing with nature protection.

7.4 Conclusions and recommendations

Conclusions

Slovenia is a country with a rich and diverse natural environment, which has not been seriously damaged by urbanization or industrialization during the pre-transition period. Moreover, the present reduction in industrial activity has contributed to curbing pollution. Nevertheless, the new economic situation with the development of the transport infrastructure, urban settlements, tourism and energy production will increase threats to the natural and semi-natural environments for the foreseeable future.

Today, there is no clear strategy to ensure nature protection, no updated legal framework and no clear sharing of administrative responsibilities and tasks (in particular for regional institutes). The management of protected areas is weak. The same could be said of the habitat protection outside protected areas and

other protection of species. Slovenia should therefore accelerate the completion of the necessary legal and institutional framework, and in particular the new conservation act and the nature conservation strategy. Pre-accession to the EU and entering the Naturopa network can be expected to improve the situation. However, it will imply an important effort to catch up on various issues: missing data should be compiled, staff should be trained, and much administrative work done to record, map, monitor and control nature protection. This will be costly, making the provision of funds from both national and international sources necessary.

Regarding the nature conservation strategy, only the MoEPP has so far been involved in its drawing-up. However, nature conservation concerns all the major sectors of activity having an impact on nature. Measures will have to be coordinated with the other affected sectors of activity (in particular agriculture, infrastructure, spatial planning, industrial activity, etc.). Involving other partners at the present stage would make the strategy more efficient than going it alone. The further cooperative involvement of the general public and NGOs by using all available means appears possible and would be an asset in the implementation of the strategy.

The rich biota of the karstic region is particularly threatened by human activity. Pollution from agriculture in the form of nutrients and other chemical substances is for the moment the main threat to the underground aquatic ecosystems. Consequently, there is a need to adopt sustainable agricultural practices. For instance, as the protected areas are generally small (only 13 of the 37 are larger than 1,000 hectares), it is necessary to take measures to protect the surrounding nature and to include it in the specific legal documents related to agriculture (see chapter 10). Other sectors of activity should also adjust their practices (i.e. avoiding the dumping of industrial and household wastes). The approach followed to preserve nature in the Alpine part of the country, and in particular the active role delegated to the local level, as defined in the Protocol on Nature Protection and Landscape Management, could serve as a model to define a strategy for the protection of the karstic region.

Slovene forestry has an international reputation for having promoted close-to-nature methods of forest management for over a century. Close-to-nature forestry is based on natural regeneration and small-scale interventions. The Forest Development Programme provides guidelines for sustainable forest management, protecting biological diversity (in particular favouring indigenous tree species and the natural composition of forests) and considering their ecological, social and production functions. The implementation of the Programme could be greatly helped, if effective coordination between the different users of forest could be established. Such coordination should lead to consensus about protection measures for sensitive forest stands.

The legal framework to protect forests against adverse human interventions is solid and the inspectorate well organized and skilled. There are educational courses at all levels to increase public awareness about forest protection and sustainable public access. A forest protection law is being drawn up. It includes new nature protection concepts and an evaluation of forest functions. Nevertheless, because of the planned 80% forest privatization and the fragmentation of forest property, it may become increasingly difficult to ensure the safe management (maintenance) of forests. Notably, it seems that over-logging is taking place in private forests, resulting in a less favourable composition in tree age and size. Protection against forest fires in the country's Mediterranean climatic zone also deserves to be high on the agenda.

Currently, the populations of some categories of wild animals are too numerous, which is endangering their habitats. Therefore, sustainable management of the livestock is necessary to keep the game population in check. An attempt is made to regulate shooting in order to maintain a safe and dynamic balance of the forest ecosystem. To this end, hunting and fishing organizations are teaching the regulations to their members, who should pass a nature conservation exam. However, these organizations are not always skilled enough to obtain optimal results.

According to the draft nature conservation strategy, Slovenia aims to expand its protected areas to 20% of its territory. Such an ambitious goal, if combined with proper management structures and practices, would certainly be a strong guarantee for the protection of valuable ecosystems. At the same time, the reasons for and the objectives of such a large expansion and the economic and social implications have not been clearly analysed.

Regarding the management of protected areas, national parks, regional parks and other important specific protected sites (Secovlje salt-pans) do not currently have management authorities. In some cases such structures do exist but their mandate is very limited. It is important that their responsibilities

should be broadened and strengthened and that management authorities can effectively participate in the planning and decision-making regarding their territory. Management authorities need to have the status of a legal person and be responsible for the approval and implementation of the plans. Other stakeholders (local communities, non-governmental organizations, etc.) should also be represented at an appropriate level. In some protected areas, management authorities could probably be financially self-sufficient thanks to tourism, although, in the beginning, the option of State subsidies might have to be explored. Other, smaller areas could be administered through a central authority in the MoEPP. Arrangements with the field personnel of the Forestry Service could help this new authority to manage protected areas.

The draft nature conservation strategy does not pay enough attention to the protection of wetlands. Furthermore, to comply with the requirements of the Ramsar Convention, Parties should develop a separate strategy on wetlands. As the Ramsar Convention criteria are becoming more flexible, Slovenia will have the opportunity to increase the number of its Ramsar sites. In May 1996, a special body with NGOs, ministries and other partners was nominated to apply the Convention. This body could be a key actor to improve the protection of wetlands.

Recommendations

Recommendation 7.1:

The draft conservation act should be urgently finalized and adopted by Parliament. It should in particular focus on:

(a) Filling in the current gaps in species and habitat protection inside and outside protected areas, and in particular in the karstic region;

(b) Restructuring the administration in charge of nature protection, redefining related task-sharing and coordination at the local, regional and national level;

(c) Coordinating the regional offices for the conservation of the natural heritage recently transferred to the MoEPP with administrative units in other ministries, such as those ensuring forestry, hunting and fishing management. *(See also Recommendation 2.1)*

Recommendation 7.2:

Strengthen the management - and, thereby, the implementation of the relevant legal provisions - *inter alia*, in the various kinds of protected areas by setting up management authorities, individual or common depending on the size and importance of the site.

Recommendation 7.3:

Implementation of the existing plans for the expansion of protected areas to their optimal level (approximately 20% of the national territory) should start, with full public participation.

Recommendation 7.4:

The National Wetlands Committee designated to apply the Ramsar Convention should act in such a way that:

(a) The specific strategy requested under the Ramsar Convention becomes a part of the nature conservation strategy;

(b) A list of the endangered wetlands is drawn up and the Convention's provisions to increase the number of Ramsar protected sites are put into effect;

(c) Management plans for wetlands are set up, and a related administrative body is designated.

Recommendation 7.5:

The development of a national biodiversity strategy should be accelerated, taking into account the already adopted strategies for the protection of nature. The national strategy should be in line with the pan-European biodiversity strategy. *(See also Recommendation 10.5)*

PART THREE: ECONOMIC AND SECTORAL INTEGRATION

Chapter 8

INTEGRATION OF ECONOMIC AND ENVIRONMENTAL DECISIONS

8.1 Options for the integration of decisions

Restructuring in transition

The integration of environmental aspects into socio-economic decision-making processes coincides, in the context of transition, with fundamental re-orientations in social and economic management. In Slovenia, the most relevant of these re-orientations are:

- Re-channelling economic output, from markets of the former Yugoslavia towards western markets;
- Shifting the management perspective from a regional to a national economy;
- Developing economic policy from a predominantly supply-oriented outlook to a management that increasingly takes demand into account;
- Increasing private at the expense of social ownership, resulting in a higher number of small enterprises;
- Adapting to the growing importance of the service sector as compared to manufacturing.

In 1995, 67 per cent of all exports were directed to the EU. The export of manufactured goods, electrical appliances, transport equipment, machinery, chemicals, metal goods, furniture and other wood products was accompanied by pressure from western clients on Slovene manufacturers to make products more environmentally friendly. The success of corresponding transition efforts, as exemplified by the re-direction of export flows, increased investment opportunities. After May 1996, the upgrading of the country's credit rating to 'A' acted as another investment stimulus.

Independence 'promoted' the previously regional level of public administration to the national level. Self-government principles were maintained for the local level of public administration - of considerable importance in Slovenia, in particular for environmental policy and management - but a 'vacuum' was created at the regional level. While it is possible to bridge this gap for the regional implementation of national policies and management (by creating regional offices of national ministries), it does not facilitate coping with issues that require cooperation between several municipal administrations. The integration of different decision-making may create additional problems, as the ad hoc arrangements for dealing with regional decisions may differ between the various ministries or areas of management in the absence of overall formal solutions.

The economic reform caused two major economic problems: unemployment (1993, 14.4%; 1995, 13.9%) and inflation (1993, 201.3%; 1995, 12.6%). To some extent, unemployment is considered to be frictional, and also inflation is likely to be largely caused by supply adaptations to newly expressed demand structures. Both these problems meet with social dissatisfaction. That and interest rates driven by inflation are thought to have had a negative impact on investment in general, and on environmental protection in particular. The Government reacted with legislation facilitating transition and following a step-by-step strategy to insert environmental issues into economic decisions, either at the stage of privatization or by stimulating investment in general.

The privatization process was used deliberately for incorporating environmental protection benchmarks into enterprise development (see below). The process led to a considerable growth in the number of SMEs (see chapter 9, table 9.3). While this could be seen as complicating the integration, the growing importance of the service sector as compared to other economic activities partly alleviates environmental problems, thus making the integration of environmental and

economic decisions in some cases less urgent. In fact, some of the most important environmental 'hot spots' used to be in mining and manufacturing, which have considerably decreased their activities in recent years - if they did not cease them altogether.

Privatization

Under the Enterprise Ownership Transformation Act (December 1992) about 1,500 socially owned companies were scheduled for privatization. The law applies to all enterprises with the exception of banks, insurance companies, public utilities, transport companies, gambling establishments and cooperatives. By 4 November 1996, 1,307 programmes had been approved, 175 programmes were in progress, and 25 privatization programmes still had to be drawn up.

To start privatization, companies prepared balance sheets of their 'social capital' (according to the prescribed methodology for privatization and ownership transfer programmes, originally scheduled to be submitted to the Agency for Privatization and Restructuring by 31 December 1994). Arable land and forests were excluded, as they were declared State property and will be managed and privatized separately later. Foreign investors may participate in the process of ownership transfer by buying shares offered for sale. Once the ownership transfer is complete, there will be a very diverse company ownership structure, as ownership is transferred to employees and their families, and, in the case of public share offerings, to external owners having invested their certificates. Foreigners are expected then to acquire shares and stakes in companies under conditions laid down by law. The policy towards foreign investments is openly defensive right now. On the other hand, the policy seems to be targetting foreign investors at the moment of capital concentration rather than at the moment of capital redistribution.

EU PHARE and EBRD are very active in the privatization and restructuring. For example, EU PHARE is helping the Agency for Privatization and Restructuring screen and draft privatization plans. It is setting up a post-privatization facility to channel training support, educating shareholders and financial-corporate managers. It is supporting the Development Fund, assisting in restructuring companies in difficulties. EBRD is providing direct funding to locally managed privatized companies through a broad range of innovative instruments, with special emphasis on equity, quasi-equity investments, syndicated transactions and co-financing. It provided an ECU 8.2 million loan for a gas distribution system for six municipalities, structured as a "Built Operate Transfer" project (see also chapter 2).

The privatization scheme encourages new environmentally friendly owners. The legal framework addresses environmental liabilities in a way that stimulates interest in tackling past pollution by making privatization easier. The Environmental Protection Act adds to the legal framework for the privatization of the Slovene economy, since it lays down environmental protection requirements for businesses. As a result, buyers are obliged to assume the burden of past environmental pollution and negligence by their newly acquired enterprise (article 9: Principle of Liability of the Party Responsible for an Environmental Strain).

The privatization regulation (on the methodology for preparing the opening balance sheet, Official Gazette of the Republic of Slovenia, No. 24/93) enables existing companies to reserve long-term funds to deal with past liabilities and invest in environmental improvement. Reserves made as of 1 January 1993 are indexed in the accounts at the end of each financial year and should be spent by 2003 on cleaner technologies or on the sanitation of a site. Companies that are committed to making such investments need to obtain project endorsement from the Nature Protection Authority of MoEPP before submitting their ownership transfer programme to the Agency for Privatization and Restructuring, in order to deduct the investment from their opening balance sheet as an environmental liability. This provision was introduced to create obligations for environmental protection investments. At the same time, it reduces the purchase price of an enterprise in privatization, thereby facilitating the process. As of 4 November 1996, 770 programmes, of which only 111 contained long-term environmental reservations, had obtained the Agency's and MoEPP approval, clearing them for registration with the court as joint-stock companies (table 8.1).

The Eco-Fund

Currently soft loans from the Eco-Fund are available to municipalities, industry and households for environmental projects. The EPA abolished the Water Fund established in 1963 and the Environmental Protection Fund established in 1990, which were essentially supported by waste-water discharge taxes,

Table 8.1: Funds committed for environment as a result of ownership transfer, 1.3.1997

	Project value Slt million	Share of total	Including projects for:	
			Waste elimination	Sanitation programmes
Total liabilities	**38,990**	**100%**	**1,901**	**37,322**
Approved	26,519	68%	1,882	24,637
Applications in progress	4,193	11%	0	4,193
Rejected applications	8,508	21%	-	68,508

Source: Report on enterprise ownership transformation, Ministry of Economic Relations and Development. As the liabilities are indexed, the 1 January 1993 exchange rate should be used.

electricity and gas charges. According to the EPA, fees for water use and charges for waste water are now transferred to the State budget. The EPA established the new Eco-Fund as a joint-stock company. It provides loans with an interest rate below commercial rates, rather than giving grants as the former Environmental Protection Fund did.

The Eco-Fund's share capital consists of budgetary contributions and the transferred loans previously awarded by the MoEPP. The Fund's revenues could be capitalized as it is a non-profit organization. The repayment of loans and interest paid by borrowers, the concessionary compensations by natural resource users, a part of collected CO_2 tax and 8.5% of privatization proceeds channelled from the Privatization Fund would make up the cash inflows. The shareholders (currently only the State) are not allowed to receive dividends. The Fund's profit is tax exempt. Its 1994 and 1995 financial accounts were audited by KPMG. The Fund is actually able to function like a commercial bank.

The Fund's current problems are: under-capitalization and interest rates practised (6% plus rate of inflation) may not be sufficiently attractive for potential clients, especially given the time required for a decision to be taken on an application for credit. The financial statements below show the share capital and the profit generated. The State is expected to inject additional funds in the share capital in 1997. EU PHARE has provided ECU 400,000 for institutional strengthening and for air pollution abatement projects..

Environmental expenditures and their funding

Environmental expenditures in Slovenia are financed from the following sources:

- The State budget: industry pays its dues to the State budget in the form of charges and fees. The Government distributes the collected funds through the ministries as loans and grants.

Table 8.2: Environmental expenditure from the State budget, 1994-1996

(in million Slt, current prices)	1994		1995		1996	
	Value	Share	Value	Share	Value	Share
Total expenditure	**4,565**	**100%**	**4,107**	**100%**	**3,913**	**100%**
Capital expenditure	3,074	67%	3,085	75%	1,834	47%
Current expenditure	1,491	33%	1,021	25%	2,079	53%
of which transfers to enterprises	1,191	26%	406	10%	1,092	28%

Note: Figures are subject to changes as methodology is under development.

Source: State Budget.

Expenditure is explicitly for environmental purposes or has recognizable, primarily favourable environmental effects (such as expenditure for improving energy efficiency). Distinction between environmental protection and nature protection has not been established. Estimate does not include grants in the form of foregone revenue due to tax deductions, allowances, exemptions, credits, or any other means of fiscal stimulation of environmental expenditure. State guarantees for environmental projects are also excluded.

Table 8.3: Environmental expenditure from the business and non-business sector, 1990-1996
[million Slt, current prices]

	1990	1991	1992	1993	1994	1995	1996
Total expenditure							
In million Slt	502	1,549	2,034	6,496	14,317	13,727	16,258(1)
% of the GDP	0.3	0.4	0.2	0.5	0.8	1.3	0.7
Current expenditure	..	..	485	1,587	1,948	2,615	2,869(1)
Investment	..	..	1,549	4,908	12,360	11,111	13,389(1)
Environmental investment	**..**	**..**	**0.8**	**1.8**	**3.4**	**5.5**	**2.8**
as % of gross investment							
Gross investment							
In million Slt	36,917	72,013	187,450	268,831	365,040	470,949	555,152
% of the GDP	18.8	20.6	18.4	18.7	19.7	21.2	22.1
GDP	196,139	349,559	1,017,965	1,435,095	1,852,997	2,221,459	2,515,000

Source: Expenditures for environmental purposes in 1990-1991 are taken from an unpublished report. The values are in dinars. Current expenditures are from IMAD based on Statistical Office, Ministry of Finance, ECO Fund and IMAD estimates.

Note: (1) estimates. Growth averages that of investment from the budget, Eco-Fund loans for investment and gross fixed investment in the business sector. Current expenditure for 1996 reflects increase in the retail price index.

- Local government budgets have been a significant source of environmental investment funding in the past, mainly through investments in public services and infrastructure. To improve environmental conditions, municipalities use funds from the State budget, revenues generated from local environmental taxes as well as donors' contributions.
- The National Environmental Protection Development Fund (the Eco-Fund) is a stock-holding company with 100% State ownership. It provides soft loans for environment-related infrastructure development and environmental protection (for details, see above).
- Enterprises' funds: during the initial stage of privatization, enterprises put aside funds to deal with environmental issues. The MoEPP endorses the expenditure (for details, see above; see table 8.1 for data).
- External sources of funding include international financial institutions (IFIs) and support based on bilateral agreements. The World Bank, a major source of funding, granted a loan of some DM 30 million to finance the conversion of domestic and small commercial heaters from coal to natural gas. Funding was channelled through the Eco-Fund. In addition, the World Bank is helping the development of the geographic information system, and the: development of a new management system for one of the major tourist areas, the Soča Valley. Bilateral aid comes primarily from the European Union (EU-PHARE, EIB, EBRD), the United Kingdom, the Netherlands, Austria and France (see chapter 2).

At the moment, comprehensive data on environmental expenditures and on their sources of finance are not available. It is thus impossible to provide a reliable and satisfactory picture of all sectoral environmental expenditures. Tables 8.2 and 8.3 are therefore presented separately. Statistical work to remedy the situation has started.

8.2 Instruments for integration

Management by public authorities

Previously, environmental management was closely related to the system of public planning. The latter had three stages: short term (one year), medium term (five years) and long term (ten years). The long-term plans outlined the broad development goals; medium-term plans included decisions which were adopted by agreement between users and suppliers of planned services and activities; one-year plans put into operation the objectives of the five-year plan. The definition of the objectives in the development programmes was conditioned by the general economic situation in Slovenia. The public planning system covered environmental protection. For the intensive use of natural resources there was a particular development procedure bringing together different interests, especially those concerning the

The Eco-Fund

Income Statement			
in million Slt	1996	1995	1994
Interest	110.2	44.4	21.6
Revenue from securities	90.7	20.7	-
Net fees and commisions	(1.3)	(1.4)	(0.1)
Other operating revenue	7.5	2.0	-
General administrative expenses	(129.7)	(69.5)	(18.7)
Depreciation	(12.1)	(9.6)	(0.4)
Other operating expenses	(198.7)	(8.6)	(2.3)
Write-offs and adjustment to bad loans	(31.6)	(11.5)	-
Revenue from dissolved provisions	(128.4)	104.0	-
Profit or loss from operations	**(37.3)**	**70.5**	**0.1**
Extraordinary profit or loss	39.9	(5.4)	-
Total profit (loss)	**2.5**	**65.1**	**0.1**

The Eco-Fund is a joint-stock company. At the moment, the State owns the fund. According to the law, any legal and/or physical entity can become a shareholder of the Eco-Fund. The Fund is a non-profit organization and, therefore, does not pay out any dividend. If other shareholders besides the State owned shares in the Fund, they could benefit only from preferential loans. A new shareholder could not have more than 33% of Eco-Fund's capital stock. No voting rights are given to shareholders. Instead, the management of the Fund is governed by a Government-appointed Board of Directors (a chairman and four members)

The Director of the Fund is appointed by the Board of Directors; his appointment is confirmed by the Government. The Fund carries out its activity in four main areas: air pollution abatement, phasing out of ozone-depleting substances, municipal infrastructure development, and reduction of pollution in industry. In June 1996, the Eco-Fund signed a DM 30 million loan agreement with the World Bank to finance the conversion to cleaner heating systems. EU PHARE provided ECU 400,000 for institutional strengthening and air pollution abatement projects.

The Global Environmental Facility's trust fund awarded a US$ 6.2 million grant to six Slovene companies to carry out a project to phase out ozone-depleting substances. As a financial intermediary, the Eco-Fund properly disburses the funds and takes care of procurement and other procedures. In November 1995, the Eco-Fund launched a municipal infrastructure project. It announced a tender for municipalities that wished to get loans for projects for sewage, waste and water treatment systems, solid waste disposal, and water pipelines. By Spring 1996, the loans amounted to DM 7 million.

A similar project was launched in June 1996, when the tender was announced for industrial companies to get loans for projects to reduce environmental pollution (air, water, solid wastes, and ozone-depleting substances). By November, a total of DM 11 million worth of loans was offered.

Balance Sheet			
in million Slt, for December 31	1996	1995	1994
Cash	42.5	42.6	25.6
Loans to banks	710.7	825.8	131.6
Loans to clients	4,313.7	3,251.8	2,244.0
Marketable securities	676.7	459.8	84.2
Tangible fixed assets	13.5	16.7	21.5
other assets	17.2	14.2	9.1
Total assets	**6,157.3**	**4,610.8**	**2,515.9**
Accrued expenses and deferred revenues	16.7	10.3	-
other liabilities	12.6	6.0	5.0
Provisions	403.4	482.3	479.0
Subscribed capital	4,721.0	3,871.2	2,031.8
Reserves	65.3	0.1	0.1
Capital revaluation adjustments	571.7	175.7	-
Transfered net profit from previous year	-	0.1	-
Net profit (loss) of the year	2.5	65.1	0.1
Total liabities and shareholders' equity	**6,157.3**	**4,610.8**	**2,515.9**

environment. Especially agriculture, forestry, industry and economic infrastructure (transport, power supply, water utilities, tourism) were affected. An important self-management feature was the formal devolution of many executive functions to the local level, either municipal administrations or self-governing associations of workers.

Before independence, many of the central government functions were handled in Belgrade, which left the Ministry of Environment and Physical Planning in Ljubljana with few resources. After independence, the Government felt the need to draw the fundamental responsibilities away from the regions to the capital. The first years were difficult as there was a constant lack of money. Earmarked funds for the environment depreciated fast because of high inflation. During this period, the Government aimed to protect the quality of water while other environmental elements were neglected, giving priority to economic development. At the municipal level of environmental management, waste and street cleaning were the responsibility of the municipal authorities and so was their financing. Monitoring of pollution was modest, owing to the lack of laboratory equipment.

The problems have not changed much. The economic reforms in the country required institutional rearrangements backed by a legislative framework. The Strategy for Economic Development is an integrated and target-oriented programme, outlining how the economy should develop and how environmental issues should be incorporated into intra-sectoral development policies. The EPA also integrates sustainable development ideas, to which NGOs have contributed (Agenda 21 for Slovenia, June 1995).

As soon as EPA was adopted, the powers were redirected. Institutions, including MoEPP, have changed their structure several times. Funding of environmental projects remains a problem. Local authorities lack funds to implement their new tasks, while article 2 of EPA transfers primary competence to the national level. The law says, however, that the 'old' structures remain operational, until the detailed regulations implementing the EPA are enacted.

Administrative and regulatory instruments

Slovene environmental legislation, in general, aims to bring about improvements by using as many incentives as possible for polluters and users of the environment. The instruments used in this strategy are both regulatory and economic.

The system of environmental permits is described in chapter 1. Standards exist for product quality and emission levels. Product quality standards have been introduced for fuels. In October 1995, the diesel sulphur content standard for road vehicles was lowered to 0.2%. In the future all fuels will have to meet quality requirements corresponding to the standards set by the EC in 1993, limiting the sulphur content of diesel fuel to 0.05% by the year 2000.

As Slovenia trades with EU, the regulated as well as factual product and process requirements of the EU markets serve as a 'yardstick' for economic decisions in the export industries concerned. Business anticipates in this way specific Slovene legal instruments. For example, the labelling of certain products, such as electrical appliances, may take EU recycling strategies into account, following enterprise decisions not required by Slovene law. This industrial strategy requires a change towards more energy-efficient and less environmentally damaging processes and products (see chapter 9).

The MoEPP, together with the Chamber of Economy, has completed the project on air emission standards (see chapter 4). Import regulations are used in connection with some objectives of environmental policy and management. The ban on importing cars or selling new cars without catalytic converters is a typical example.

Economic instruments

The EPA lays the legal basis for fees and charges. Charges are prescribed for water, soil and air pollution as well as for the generation of waste. The bases for the calculation of actual charges are provided, and the MoEPP is in principle mandated to regulate the details. However, if the pollution concerns only the local population, the local authorities may prescribe the charges. Finally, the MoEPP may exempt polluters from paying charges, if they present a satisfactory rehabilitation programme, which must be approved by the MoEPP.

The Government started levying its charges with emission charges on waste water (Official Gazette No.41/95) and a charge on water use (Official Gazette No.41/95 with amendments in No.8/96). An emission charge on waste water and a user charge on drinking-water had existed since 1976. The price of

water was established taking into account both charges.

The previous emission charge on waste water was targeted at industrial enterprises. It was calculated annually for each pollutant and included aggregate factors such as pollution coefficient, number of working days per year of the enterprise, and output produced in relation to the waste-water discharge. The drawback was that the charge was fixed annually, and as inflation was high in 1991-1993, the charge lost its effect. With inflation now around 10%, the distortion still exists, but to a lesser extent. The recent regulation categorizes waste water into several classes (industrial, communal, and stormwater). Polluters are divided into two groups. One group pays the charge for industrial waste waters directly to the State budget. The other pays the charge for communal and stormwater to the public enterprise handling the discharges and treating the water. The enterprises then channel these revenues to the State budget.

Previously, the pollution coefficient was calculated for each type of production. Now, for the industrial waste water, the charge is calculated on the basis of substance concentrations. For communal waste water, the quantity of water discharged from an enterprise is the major determinant. The charge for stormwater depends on the surfaces covered. The charges are revised annually. The charge will rise progressively. When a facility is upgraded to comply with standards or when other measures/programmes to minimize pollution are implemented, the charge is phased out. The gradual introduction of the methodology encourages polluters to adjust measurements, assessments, and reporting. The incentive for polluters to reduce pollution by investing in less polluting technology appears to be effective.

The user charge on drinking-water applies to all users of the public water-supply system. The charge is a fee for the use of water as a natural resource and partially covers the cost of treating drinking-water. The charge is indexed. The proceeds are channelled to the State budget.

Expenditure for environmental purposes can be deducted from corporate and personal income tax. The corporate income tax rate is 25%. Funds established for ecological and other non-profit purposes are exempted from this tax. The allowable deduction currently amounts to 40% (before 1 July 1996 it was 20%) of the financial means invested, but may not exceed the tax base. In addition, reserves for investments in Slovenia may be deducted up to the amount of 10% of the tax base. Such an allowance may be granted for a four-year term.

Personal income tax is progressive. The taxable income may be cut by 3%, if a person contributes to ecological purposes.

Subsidies are helping to phase out domestic coal mining by closing some mines. Also, they help keeping operational those that could tackle environmental damage problems. By subsidizing mines and the energy industry, thus keeping energy prices down, the country tries to mitigate the effects of unemployment and inflation, and avoid social problems.

Since 1991, coal mining has been subsidized from the State budget. The Government tried to keep the current input price of coal used at thermal power plants and heating plants at Slt 350 to 450 per GJ, and thus indirectly influence the cost of production, transmission and distribution of electricity. In 1991, the production of lignite was subsidized with Slt 163 million, brown-coal production with Slt 320 million. In 1992, brown-coal production subsidies increased to Slt 601 million. In 1993, the State budget earmarked Slt 620 million for the same purpose. In 1994, the subsidies dropped to Slt 512 million, and in 1995 to Slt 488 million. In 1996, the State did not earmark any funds for these subsidies.

Public funds were used to close down brown coal mines in Zagorje (Senovo and Kani arica mines). In 1994, Slovenia spent Slt 95 million from its budget on closing down mines. In 1995 and 1996, the figures were Slt 1,323 million and Slt 3,260 million. To close down other mines (Idrija, Me ica, and Kamnik), subsidies worth Slt 900 million, Slt 837 million, and Slt 1,031 million were allocated in 1994, 1995 and 1996, respectively.

The EPA includes provisions for concessions. The provisions are strictly analogous to the ones governing the establishment of charges. The process of granting concessions for the exploitation of natural resources has begun with the issuing of regulations concerning the commercial exploitation of water in different areas of the country. The following regulations on concessions are currently applied: for exploring the energy potential of the river Sava (Official Gazette No. 21/94), for the exploitation of springs of the stream Nemiljš ica and of the spring Proš ek in Kne ke Ravne (Official Gazette No. 71/94), for the exploitation of water from parts of the

watercourse Mošenika and Trebušice for the breeding of salmonids (Official Gazette No. 66/94, 71/94, 26/95), for the exploitation of parts of the watercourses Skopičnik, Tbin, Koritnica, Prodarjeva Grapa, Bača, Velunja, Mislinja, Mirtoviški Potok, Sava Dolinka, Rupovščica, Bohinjska Bistrica, Topla, Rajhenbah and Kne a for electric power generation (Official Gazette No. 66/94, 71/94), for the exploitation of parts of the watercourses Hotoveljščica, Temenica and Briški Potok (Official Gazette No. 9/95, 26/95), for the exploitation of parts of the watercourses Prošček, Kne a, Bača, Ročica, Brusnik, Klav arica, Radovan, Završnica and Vipava for electric power generation (Official Gazette No. 9/95, 26/95).

As the State preserved the authority to determine the price of a particular natural resource which is the subject of the concession agreement, it will not jeopardize general economic objectives. The regulation sets out the conditions for the granting of concessions. Concessions are granted for an indefinite time, and the Inspectorate for Environment supervises the activities of the concessionaire. Concession payment, for example for the use of a water resource, amounts to one per cent of the average water price for the entire amount of pumped water, and is shared between the national budget (20%) and the municipality where the water source is located (80%). From 1996, the proceeds from concessions are to be transferred to the Eco-Fund. By November 1996, about 40 concessions had been given to fish farms and almost 70 to small hydro plants, irrigation systems, drinking-water exploitation, and for artificial snow-making.

8.3 Conclusions and recommendations

Conclusions

The integration of environmental concerns into socio-economic decision-making requires an appropriate legislative basis, proper implementing mechanisms, adequate institutional arrangements, cooperation from a large number of actors in the public and private sectors, and the dedication of sufficient financial means. Looking at the Slovene situation from this perspective, it is clear that the country has not ruled out any major options for the required integration at the legislative and the conceptual level. This is an impressive result, as it was reached in the light of the political priority that Slovenia had to accord to economic development after independence.

The Environmental Protection Act and the Strategy for Economic Development are currently the most important achievements at the legislative and conceptual levels. To this, the National Environmental Strategy and the National Environmental Protection Programme will soon be added. All these fundamental texts refer to environmental concerns and necessities for the economy as a whole, as well as for individual sectors - like agriculture, manufacturing industries, energy and transport mentioned in the Strategy for Economic Development. The texts refer repeatedly to sustainable development as being an objective of overriding importance for the country.

The legislative package does not seem to put important constraints on the integration of environmental concerns into socio-economic decision-making. However, a different picture emerges with regard to implementation. It has not yet been possible to develop and apply the detailed regulations required. The accumulated delay is most apparent regarding the objectives of sustainability. Non-governmental organizations have preceded the Government by publishing proposals. While sustainability continues to be a difficult objective to implement in all contexts, it appears that more could be done, if interested resources were pooled. The planned adoption of the National Environmental Strategy and the National Environmental Protection Programme (currently under preparation) will help to formulate sustainable development in a more practicable way.

In general, efforts to integrate environmental objectives in economic decisions could be made more prominent in regular reports on economic development. The ‘Spring and Autumn Reports’ with a short-term and medium-term economic analysis, and the ‘Budget Memorandum’ could be useful for this purpose.

Regarding the levels of public administration, the EPA emphasizes local self-administration and autonomy in the management of pollution. In principle, the local level of administration appears to be of particular importance for environmental management, and the Slovene constitution offers very positive possibilities in this regard. However, local authorities lack the funds and expertise to carry out the related tasks. Also, for many issues, the efficiency of management depends on cooperation between municipalities, which alone are not optimally

equipped. The general absence of a formal regional level of administration is therefore regrettable. The same holds when considering the need for translating environmental management strategies into the decisions of non-public decision-makers. The tasks can be achieved only with difficulty, if there is no formal coordination of municipal approaches. Finally, the scarcity of environmental management expertise calls out for regional pooling, where possible.

It is likely that a creation of regional administrations would also lead to a more effective transmission of industrial needs for environmental management. Two trends justify a special effort in this regard. Firstly, the growth in the number of small enterprises complicates the tasks of monitoring and managing the environmental impact of economic activities. Secondly, it appears that enterprises which export to EU markets have anticipated the introduction of the type of regulations and practices that can be expected when Slovenia accedes to the EU. Given Slovenia's privatization objectives and its accession strategy to the EU, it would seem mandatory for the State administration to be optimally equipped with a view to meeting forthcoming obligations, as well as to maintaining the existing momentum in industry towards the introduction of more environmentally friendly practices throughout.

The availability of currently scarce experts in environmental management is a special aspect in this connection. The MoEPP should, in any future development of qualifications of its staff, not overlook the need for economic and social experts. Bridging current gaps in this regard might also help increase the coordination capacity of the MoEPP with ministries and administrations in economic domains.

Funding is perhaps the thorniest issue of all in the context of management improvements. Even if instruments including funding capacities will not permit to attain all goals, some results could be reached more easily than others. For example, the links between the legal authority and the budgetary authority were not always apparent during the EPR mission. For instance, the budgetary allocations to local authorities should enable them to fulfil their legal obligations. It can also be said that the need for more environmental expertise appears to be felt more acutely at the local levels.

The Eco-Fund is set to be the main instrument for the financing of environmental investments. It is a marked improvement compared to its predecessor, the Environmental Protection Fund. However, even the current version of the Eco-Fund is not without its problems. Its volume of transactions remains much below that of commercial banks. As a result, its costs are relatively high, and, consequently, the interest rate advantage it can offer may not be enough to compensate the borrower for the time needed in deciding on an application. The prospect for possible remedies appear somewhat limited, if the present conceptual foundations of the Eco-Fund remain unchanged. It can be hoped that the present discussion of the issue in Slovenia produces alternative options, so that a final decision on the concept or concepts of public assistance to environmental investments can be taken rationally in the near future.

In the meantime, the Eco-Fund should be strengthened by making budgetary means available to it. Furthermore, the gradually emerging system of charges for the use of natural resources will further help make the necessary investments together with the Fund. If feasible, the merging of the Eco-Fund with similarly structured funds (i.e. like the energy efficiency fund) could further alleviate the situation and help streamline their operation.

The practice of discounting assets for privatization with environmental commitments, has had two consequences. Firstly, it allowed cheaper privatization of the company. Secondly, in the presence of shortages of working capital and relatively expensive bank loans, it made it possible to use company funds as working capital in the meantime. To ensure that commitments actually lead to environmental investments, a new regulation is before Parliament for approval. It stipulates that, should an enterprise not use the committed funds to improve the state of the environment, the amount should be transferred to the Eco-Fund. It can be expected that this regulation, if enforced, will be sufficient to ensure that existing commitments are met.

Environmental taxation could, in the long run, replace the Eco-Fund as the most important instrument for achieving environmental improvements. The introduction of a CO_2 tax (January 1997) will help gather experience in this field. The related strategy should from the beginning be developed with the wider perspective of establishing a comprehensive system of economic tax incentives for environmental protection in mind.

Recommendations

Recommendation 8.1:

The range of fundamental conceptual instruments steering environmental policy should soon be complemented with a strategy towards sustainable development, formulated on the basis of broad social consensus. The Strategy should cover national, regional and local development. It should integrate sectoral economic, environmental, social and spatial considerations.

Recommendation 8.2:

The major governmental publications reporting on economic development should be extended to cover routinely issues of environmental management.

Recommendation 8.3:

Future increases in the resources of the MoEPP should in particular be allocated to the areas of coordination with industry, i.e. economic and related expertise should be seen as a priority.

Recommendation 8.4:

A comprehensive tool-kit of economic and fiscal instruments for use in environmental management should be developed jointly by the MoEPP and the Ministry of Economic Affairs. This work should also enable an informed decision on the future of the Eco-Fund, which should be assessed against other possible funding mechanisms for environmental protection.

Chapter 9

INTRODUCTION OF CLEANER, SAFER AND LESS RESOURCE-USING TECHNOLOGIES IN INDUSTRY

9.1 Environmental attributes of industry

Use of material resources

Slovenia's industry has traditionally used metals, energy, water and wood as its main material resources. Their national use rates largely depend on the weight of particularly resource-intensive industrial sectors within the overall structure of manufacturing. The Commission on Sustainable Development lists, as part of its indicator 'Share of natural-resource intensive industries in manufacturing value-added', four industries: petroleum refineries, manufacture of miscellaneous products of petroleum and coal, iron and steel basic industries, and non-ferrous metal basic industries. The list can be extended to cover the main water- and wood-using industries in order to complete the picture with regard to renewables.

In Slovenia, the structural changes that occurred between 1988 and 1992 considerably reduced the relative importance of metal industries - iron ore ceased to be used in 1991, and other metal raw materials primarily stem from recycling - and the water-intensive activities in the food, beverages and tobacco industries grew. The GDP weights of the other groups of resource-intensive industries are also affected either by slow growth or stagnation. Table 9.1 illustrates these trends.

The energy intensity of industrial production (chapter 11) could be reduced through technological change by an estimated 25% while maintaining stable growth. Statistics on water use make it possible to distinguish between the re-use of water and freshwater use. However, the data cover only 1991 to 1994. They show that re-use is significant only in the manufacturing of basic chemicals, basic iron and steel, and paper products. Furthermore, water-use intensity - measured as water use by sector per unit of GDP - seems to be declining in the food, paper and paper products industries. These results are shown in table 9.2. Overall, the quantity of water used by industry, and excluding cooling water, has dropped drastically by more than 60% since 1980.

The production of industrial raw wood dropped between 1980 and 1993 both in terms of volume and in relation to gross annual increment. However, it almost doubled between 1993 and 1994 in terms of volume, reaching about 35% of gross annual increment. At the same time, imports of timber also grew from 46,000 to 280,000 cubic metres, providing for an almost 50% surplus of imports over exports in volume terms.

As table 9.3 shows, the share of small enterprises (employing not more than 50 persons) prevails in all industries in Slovenia's manufacturing sector (84.2% in 1995). Thirty per cent of them are privately owned enterprises. The large companies contribute 76% to total export.

The large companies, having both research and financial resources, have incorporated long-term pollution prevention measures (cleaner technologies and products, environmental management systems and, occasionally, eco-labelling) into their improvement programmes. Small companies, because of their lack of financial resources and expertise, tend to deal with environmental policy on an ad hoc, short-term basis.

Table 9.1: Share of natural-resource-intensive industries in manufacturing value-added, 1988-1992

Manufacturing sector	Share in GDP [%]				
	1988	1989	1990	1991	1992
Manufacture of coke, petroleum products & nuclear fuel	0.6	0.12	0.2	0.6	0.9
Manufacture of other non-metal mineral products	4.3	4.2	4.8	4.4	4.9
Manufacture of wood & wood products	4.4	2.6	5.4	3.7	3.4
Manufacture of paper, publishing and printing	6.4	6.3	7.4	9.2	7.4
Manufacture of chemicals, chemical products	8.6	8	9.3	10.3	8.9
Manufacture of food, beverages & tobacco	6.5	9	11.6	14.3	14.6

Source: Statistical Yearbook of the Republic of Slovenia, 1995.

Table 9.2: Intensity of water use by type of water, in selected manufacturing industries, 1991-1994
[m^3 /US$ 1000 GDP]

Industrial sector	1991 FWI	1991 RWI	1992 FWI	1992 RWI	1993 FWI	1993 RWI	1994 FWI	1994 RWI
Smelting, alloying & refining of non-ferrous metals	0.42	0	0.42	0	0.43	0	0.37	0
Manufacture of metal products	0.36	0.06	0.35	0.07	0.44	0.07	0.63	0.06
Manufacture of chemical products	1.18	0.01	0.91	0.01	0.52	0.01	0.48	0.014
Manufacture of food products	0.65	0.004	1.02	0.004	0.71	0.003	0.52	0.001
Manufacture of basic chemicals	0.5	0.25	0.88	0.13	0.72	0.09	0.42	0.37
Manufacture of basic iron & steel	2.55	2.18	1.35	1.18	2.03	1.06	1.49	0.84
Manufacture of paper & paper products	3.67	2.69	3.09	0.9	2.41	1.47	1.25	0.37

Source: Statistical yearbook of the Republic of Slovenia, 1995.
Description: FWI - fresh water indicator (fresh water consumption in m^3 per $1000 GDP);
RWI - reused water indicator (reused water consumption in m^3 per $1000 GDP)

Table 9.3: Manufacturing and mining enterprises by size, 1995

Sector	LE %	ME %	SE %	Total %
Total	**4.74**	**11.04**	**84.2**	**100**
Chemicals, rubber and pharmacy	2.56	9.69	87.75	11.28
Electrical equipment and apparatus	4.53	7.69	87.77	14.91
Machinery and metal working	3.14	11.69	85.17	21.68
Transport equipment industry	8.93	22.32	68.75	2.31
Textiles and clothing industry	8.19	14.87	76.94	9.31
Sawmill industry and furniture	3.79	11.83	84.38	13.07

Source: Ministry of Economic Affairs of the Republic of Slovenia, (Information System).
SE - small enterprises (up to 50 employees); ME - medium enterprises (51 - 250 employees);
LE - large enterprises (over 250 employees)

Table 9.4: Waste-water discharges from industry
[in million m^3]

Year	Mining	Electricity production	Metal industry	Chemical industry	Paper industry	Other industries	Total manuf. ind*
1980	34.60	154.5	72.9	13	65	101.1	252
1985	34.10	651.5	41.7	13.1	53	77.2	191.3
1990	8.10	602.4	36.5	20	44.6	46.4	147.5
1993	0.82	524.6	37	12	15.8	36.9	101.7
1994	2.00	698.5	25	12.9	23	31.7	92.6

Source: Statistical Office of the Republic of Slovenia.
* excluding mining and electricity production.

Pollution of environmental media

Air. Air pollution is primarily generated by the industrial combustion of fuels and by transport. Electricity generation, ferrous and non-ferrous metal processing and the pulp and paper industries are among the biggest polluters.

In recent years, air quality has improved as a result of the fuel switch from local high-sulphur lignite to imported coal, the increased use of gas, the implementation of new regulations on air emissions from point sources and motor vehicles. In 1995, a desulphurization unit was put into operation at the Šoštanj power plant. Thanks to an ozone-depleting substances project, aimed at eliminating chlorofluorocarbons (CFCs) from all products and production processes in Slovenia, the use of CFCs has decreased substantially.

Water. Both ground- and surface water quality are affected by industrial activities. The volume of waste water discharged from selected industrial sectors is shown in table 9.4. Most of the large discharging plants are located in the Danube catchment area. They include 15 food-processing factories, 6 paper mills, 16 heavy metal plants and 7 other plants.

Waste. In 1995, industry generated about a quarter of total waste. Of that amount, 41% came from energy production, 16% from coal mining and 29% from manufacturing (of which: food processing 29%; sawmills and manufacture of wood boards 27%; manufacture of textile products 10%; mining of non-ferrous metal ores, manufacture of metal products, basic iron and steel, chemical products 6-7% each). Data on industrial waste are incomplete and where existing not comparable, as the survey techniques used are not satisfactorily developed. A market for secondary raw materials exists. For example, the entire iron and steel industry works with scrap iron.

Changes in the industrial structure since independence

The market shifts since independence have deeply affected the structure of industry. The output of the heaviest polluting sectors has dropped (table 9.5). The manufacture of petroleum products and nuclear, rubber and plastics products, food, beverages and tobacco, and leather and leather products, all did better. In 1995, chemical products did best, but production of electrical appliances and of food and beverages was also above average.

An environmental protection industry is developing in Slovenia. However, it is very difficult to describe it, as data are not systematically collected. Thus, the volume of production and the types of services offered cannot at present be assessed. The only data available are on waste-collecting, trading and recycling enterprises. In this group, 50 small, privately owned enterprises operate. In addition, 10 small, two medium-size and one large enterprises are currently in the process of privatization. Other eco-industries are hidden in the particular industrial branches. A list of enterprises dealing with waste management is available at the Chamber of Economy.

Environmental accidents

During 1987-1994, there were 22 industrial accidents in Slovenia (including those related to the transport of chemicals) that resulted in the spilling of dangerous substances into water.

Table 9.5: Development of production of heavy industry (physical indicators)

Manufacturing sector	Production of 1990 (=100)	Production compared to 1990 (%)			
		1991	1992	1993	1994
Production and distribution of electricity	12340 mil kWh	103	97	95	101
Manufacture of refined petroleum prod.-fuel oil	116 000 t	108	91	98	79
Manufacture of basic non- ferrous metals:					
refined lead	12 163 t	79	64	53	61
alumina	83 000 t	57	8	2	4
aluminium in blocks	99 508 t	91	85	83	77
mercury	37 t	83	32	0	16
Manufacture of some metal products:					
iron castings	88 627 t	82	71	63	67
non-ferrous metal castings	11 747 t	94	78	63	79
iron, tin & other metal struct.	11 340 t	60	65	67	54
Manufacture of metal products - as a whole	227 192 t	83	75	67	67

Source: Statistical Yearbook of 1995.

9.2 Meeting technological objectives in industrial development

Objectives

Some requirements for the integration of environmental objectives into industrial activities and management are prescribed in the Environmental Protection Act, while others result from international treaties and conventions or from market features. Two requirements from the EPA are:

- Environmental records need to be kept of the material consumption and environmental impact of industrial activities. The implementation of this provision still requires a regulation specifying the activities concerned, the scope and contents of the records, as well as their presentation to the MoEPP.
- Appointment of an environmental protection officer by a company responsible for an environmental impact. The officer should implement the environmental protection regulations, recommend appropriate measures to prevent and eliminate environmental impact and ensure public access to relevant information. The conditions, responsibilities and scope of work of this function have not yet been laid down, as a draft prepared by the MoEPP was rejected by the Chamber of Economy for being incomplete.

The EPA requires that when a company is privatized its environmental impact should be assessed and its liabilities settled. The party responsible for environmental impact or its legal successor is obliged to eliminate the impact (see chapter 8). However, there are no special criteria for the evaluation of rehabilitation programmes. The MoEPP is not equipped to perform a technological evaluation. If the rehabilitation programme is not implemented, according to a new regulation waiting before the Parliament for approval the corresponding amount of money will have to be paid into the Eco-Fund. The modernization and privatization plans concern the basic iron and steel industry, the paper and pulp industry, the car industry and shipping companies.

Furthermore, the EPA requires the introduction of technological processes that minimize environmental change. The use of hazardous substances is to be limited, and less waste to be generated. The implementation of best available technologies (BAT) is required, even if their application leads to higher, but reasonable, costs. The implementation of best available technologies not entailing excessive cost (BATNEEC) will also be stipulated by the NEAP. According to the EPA, emissions of noxious substances should be reduced by optimizing processes and improving the operation of all appliances and installations.

The Strategy for Economic Development of Slovenia promotes sustainable economic development. It also refers to measures aiming at the lowest possible level of technologically unavoidable pollution. These

provisions are included in the National Environmental Action Plan, of which the first version has been drawn up. Its short-term targets (to be realized within three years) include:

- Completion of the reform programme for the regulatory and permitting system for water use and for industrial enterprises, in accordance with EU practices (based on integrated pollution prevention and control, and BATNEEC);
- Adoption of emission limits and introduction of water permits for new industrial sources based on BATNEEC and integrated pollution prevention and control practices.

In the medium term (i.e. within five years), these principles are to be incorporated into permits for industries affecting critical areas. Furthermore, best available practices for the use of agrochemicals in agriculture are to be developed.

A draft of the Strategic Guidelines on Waste Management was completed in 1996 (see chapter 6). The goal to reduce industrial waste generation by about 45% before the year 2000 is to be attained by the following measures: technological development and research, incentives for the introduction of the appropriate environmental standards, a more realistic valuation of natural resources, economic measures (different types of charges, insurance premiums, deposits, and economic incentives), inter-ministerial coordination, and promotion of waste minimization practices. The proposal of a development scenario assumes that companies will invest both in waste treatment facilities and in cleaner technologies. According to a short-term programme incorporated in the waste strategy, Slt 50 million a year will be earmarked for the development of branch concepts, while Slt 150 million will be devoted in 1997 to research and development at pilot and demonstration levels, giving priority to specific waste utilization schemes in selected production processes.

Hazard management is in general covered by the Environmental Protection Act. It defines the areas of cooperation and responsibilities of eight ministries and gives general guidelines for a system of response. The Law on protection against natural and other disasters of 1994 is the legal basis for preparing the protection and rescue plans. The Administration for Civil Protection and Disaster Relief, established within the Ministry of Defence, is primarily responsible for the safety of the population in the event of a disaster. It calls on rescue and fire services when necessary. Civil defence is organized for prevention, preparedness and response to disasters.

Prevention measures are foreseen for industrial activities that involve dangerous substances. Other industrial hazards are partly covered by the environmental impact assessment regulation. The risk assessment is included in the authorization procedure (to obtain a building permit, a company must obtain consent from the Ministry of Defence).

Several laws and regulations are devoted to different types of dangerous substances. There is a procedure for classifying, labelling and registering potentially toxic chemicals. The manufacturers, importers or end-users of these substances are obliged to take measures to prevent accidents, like appropriate storage and handling. They are also obliged to provide information to the competent authorities on the substances used, related installations and accident situations. A system of information, warning and rescue action is in place for accidents during the transport, production, handling and storage of chemicals. Chemical companies are under an obligation to establish emergency plans. Many companies, especially of small or medium size, do not have such plans. Inspectorates specialized in a given area are in charge of inspection and action during emergencies.

The existing laws and procedures have not been fully put into practice. A list of substances to be banned and causing severe risks is in preparation. It is designed to be compatible with EU standards. The adoption and enforcement of control legislation on hazardous substances complying with EU standards will be incorporated in the National Environmental Action Plan, as a medium-term target. The new law on chemicals will be implemented by the end of 1997. The first draft was drawn up within the Ministry of Health. There is no special legislation on good laboratory practice.

Prevention of industrial pollution

A water management consent is required for any water use, realization of a waterworks project, or water discharge. At present, two related charges exist, i.e. on water use and on waste-water discharge (see details in Chapter 8). For industrial polluters, the tax on waste-water is calculated on the basis of the chemical oxygen demand (COD) of the waste water discharged. The tax rate was Slt 200 per COD unit in 1995, and Slt 600 in 1996. It will be increased to Slt 1200 in 1997. A company offering a sanitation plan

to reduce polluting discharges may be exempted from the tax if it spends the money on the proposed activities. The introduction of taxes charged on the basis of other constituents is scheduled as follows: for heavy metals from 1 January 1997, for halogenated organic compounds from 1 January 2000, and for nitrogen and phosphorus from 1 January 2003.

Currently the Government is preparing a new strategy for water management. The new emission ceilings will take into account the best available production and waste-water treatment techniques.

Incentives similar to those for the reduction of waste water do not exist for technological change to curb the generation and discharge of air pollutants or waste. However, operating permits are required for all sources of air pollution. Companies are obliged to observe the emission levels defined in regulations that were adopted in 1994. The compliance with regulations is inspected by the Inspectorate of the MoEPP. If the permissible levels of emissions are exceeded, the Inspector can order the polluter to take appropriate measures, and impose a fine if the measures are not executed. The maximum fine is about DM 2200. The penalties are not applied, if the companies prepare sanitation plans, in which they define the measures they intend to take to reduce the emissions. There is no methodology for preparing, or for evaluating sanitation plans, as the appropriate regulations have not been approved. The efficiency of inspections is sometimes doubtful, since the organization and the scope of responsibilities changed in 1995, and there is a lack of staff to perform all related duties.

The income accruing to the State budget from industrial taxpayers' environmental charges and taxes amounted to slightly under Slt 105 million during the last four months of 1995. The expected 1997 revenues from water charges are Slt 1900 million. Other economic instruments used in environmental management include tax deductions for certain products (insulation materials, unleaded petrol), deductions in corporate income tax for long-term investments, and reduced interest rates on loans (from the Eco-fund) for environmental improvements.

Eco-labelling and awards for achievements in environmental protection do not exist, for lack of regulations. A draft of a procedure and conditions for eco-labelling was prepared by the Chamber of Economy in 1992, but not adopted.

Technological change occurs through environmental investments. Table 9.6 provides data on total as well as environmental investments in mining, manufacturing and electricity supply. The data show a clear increase in environmental investments from 1992 to 1994, both in absolute numbers and in their share in total investments. The bulk of these investments was devoted to the protection of the air. Assuming that the installation of new technology necessarily leads to the operation of cleaner technology, most of the beneficial effects of environmental protection are therefore to be expected in relation to air pollution.

Co-funding of environmental investments is a scheme whereby the State and an enterprise jointly finance investment projects. The State's contribution can amount to a maximum of 30% of the project's value. Decisions on co-funding are taken on the basis of public tenders. Co-funding grew from around DM 2.5 million to approximately 6 million a year between 1991 and 1994. The co-funded projects ensure direct reductions in emissions through purification plants, etc. Technological improvements intended to eliminate emissions of harmful substances do not generally have priority over other projects. However, some projects of this kind were among the investments co-financed. The projects concerned related to investments for the prevention of air pollution, water conservation and waste reduction. Some technological changes associated with such co-funded investments in 1993 and 1994 are listed in table 9.7.

Industrial initiatives

The need to find new export markets in western Europe after the collapse of the former Yugoslavia implied a drive for cleaner production. In order to comply with the demands of western markets, leading Slovene companies have been working on the modification of technological processes and products, substitution options for raw materials, and the renovation or replacement of plant equipment. For instance, industry has been working for some years on the elimination of ozone-depleting substances (ODS) from all products and production processes.

Table 9.6: Expenditures for investments in mining, manufacturing and electricity supply

	1992		1993		1994	
	mln Slt	[%]	mln Slt	[%]	mln Slt	[%]
Total industrial investments	46,923	100	61,888	100	78,608	100
Total environmental investments	649	1.38	3,516	5.68	10,539	13.41
of which:						
Air and climate	306	0.65	2,505	4.05	9,510	12.11
Waste management	77	0.16	292	0.47	435	0.55
Other (including water)	266	0.57	720	1.16	593	0.75

Source: Statistical Yearbook of the Republic of Slovenia, 1995.

Table 9.7: Examples of technological changes through co-funded investments, 1993-94

Investor	Description of the technological changes	Contribution by the State	
		DM 1000	%
Investments referring to changes in technology co-funded in 1993			
TRIMO, Trebnje	Cessation of the use of ozone-depleting substances (according to Montreal Protocol requirements)	180	18.8
TEKSTILNA TOVARNA, Prebold	30% reduction in waste water, 20% reduction in solid waste, compliance of waste-water quality with standards	540	25.5
EKOUREK, Novo Mesto	Hydraulic and lubricating oil recycling - reduction of waste oil by 200 t/year	70	19.4
KOMPODJETJE, Ljubljana	Introduction of a wet procedure of gritting work on black ice using $CaCl_2$, reduction of specific salt consumption	170	28.1
OPTE, Ptuj	Renovation of the proceess of baking electroplating sludge into bricks	40	30.0
Investments referring to changes in technology co-funded in 1994			
LTH, Skofja Loka	Exchange of CFC 11 and CFC 12 for R 134a or cyclopentanon (Montreal Protocol requirements)	390	30.0
TKI, Hrastnik	Reconstruction of chloralkali electrolyzing plant, change to membrane procedure, cessation of the use of mercury, reduction of specific power consumption by 35%, risk reduction of chlorine discharges	1510	9.8
GORENJEGA, Velenje	Modification of technology for surface treatment, exchange of cyanide and sour copper plating for half-gloss nickel plating (elimination of cyanides), reconstruction of dangerous substances warehouse	180	17.5

Source: Environmental Report 1995.

In particular, in 1989, Gorenje GA, a producer of electrical appliances, eliminated 1,1,1-trichloroethane from cleansing processes, thus halving its use of CFCs. In 1995, the same enterprise introduced cyclopentane and isobutane as alternatives to ozone-depleting gases. During the last five years, its expenditures on technology or product improvement have amounted to DM 25-30 million. Another example is LIV Postojna. In addition to eliminating 1,1,1-trichloroethane, it replaced cyanide zinc electrolytes in the production process and reduced PCBs by 70%. Currently, the company is working to reduce energy consumption. Both projects were financed by the companies themselves. The two examples were chosen to illustrate progress; there may be others, but detailed information was not available at the time of the review mission.

Also to attract potential western clients, several companies intend to introduce an environmental management and audit scheme (EMAS). In 1994, the Slovene Institute for Quality and Metrics, together with the Ministry of Science and Technology, launched a two-year pilot project “Implementation of

EMAS in Slovenia" for eight industrial companies. The project has been completed. While it proceeded, the companies passed the preparatory review and partly prepared the EMAS documentation on the basis of BS 7750, with the support of the Slovene Institute for Quality and Metrics. After the termination of the project, the companies continued the process, shifting to the ISO 14000 series as reference. About 50 other companies started to develop environmental management systems (ISO 14001) in response to client demands. The companies cover the costs of the programmes, as loans with preferential interest rates are not available for this purpose. The chemical, electronic and pharmaceutical industries are the keenest to introduce EMAS as they face strong international competition.

Eco-auditing is not currently practised in Slovenia. However, some eco-audits have been carried out as part of PHARE programmes. Life cycle analyses are not carried out either.

The average R&D expenses of big industrial enterprises amount to 2.5 - 3% of their total expenses. Small companies often cannot afford to finance environmental R&D. They can get some technological help from their branch associations established within the Chamber of Economy.

Role of the Chamber of Economy. The Chamber supports the industrial companies with professional training and education, information on technological developments, consultancy in the field of quality assurance, and international contacts (see chapter 1). Each of the 25 branch associations established within the Chamber has a group for development designed also to discuss and resolve technological and environmental problems.

The Chamber hosts a Technology Department, which is actively involved in environmental issues. It includes a Commission for Environmental Protection and sub-departments for waste management, packaging wastes, eco-labelling and EMAS. Its Department for Waste Management participated in the drafting of emission regulations and the Strategic Guidelines on Waste Management.

In 1994, an association of environmental business was established within the Chamber to support the development of a market for environmental industries and services. It includes legal and physical persons carrying out environmental protection activities privately or in public services.

In the framework of EUREKA, and as a member of the EUROENVIRON Working Group on Industrial Waste, the Chamber of Economy participated in the drafting of a guide on R&D needs and opportunities to solve industrial waste problems. The guide contains technological information on selected waste streams as well as on waste management approaches in different countries.

The Chamber of Economy also serves as an information centre. Information about companies, offers and enquiries from Slovene and foreign companies, legislation, professional and business literature, conferences and services are provided by its Infolink Bulletin Board System. This system, however, does not provide specific databases on cleaner production or other environmental management schemes. Systematic information about particular cleaner technologies implemented in Slovene companies is not available. One of the problems is lack of staff - only two persons in the Chamber deal with environmental affairs.

Public research and State support

The public expenses for research and development - about 1.6% of GDP a year - are coordinated by the Ministry of Science and Technology, according to the National Research Programme. There are three types of programmes: basic research, applied research and goal-oriented research. Half the technological R&D is funded by the Ministry of Science and Technology. The goal-oriented research programme did not include any project on cleaner production in 1994-1996, but EMAS and waste minimization are among the priorities for the future.

Two additional funds were also established in 1994:

- The Slovene Science Foundation, established by the Ministry of Science and Technology and 19 co-founders (companies, universities, research institutes, banks) to gather funds from subsidies and grants; and
- The Technological Development Fund of the Republic of Slovenia, to promote the transfer of R&D findings to producers and the market. It was created to help new-technology-based enterprises and small companies. Investments are linked to original know-how - up to DM 500,000 per project. It also creates databases and gathers groups of experts to help SMEs.

Industrial research and development and the promotion of high technology are also the subject of international cooperation. Cleaner production in the leather industry was discussed during the International Workshop on Pollution Abatement and Waste Management in the Tanning Industry for Countries of the Danube River Basin, organized in Ljubljana in 1995 under the auspices of the United Nations Industrial Development Organization (UNIDO). The workshop was devoted to preventing pollution at its source, waste management and effluent treatment. Its findings are being implemented in the leather companies. At present, a World Bank-supported project for the phase-out of ozone-depleting substances is taking place. The Global Environmental Facility Grant Agreement worth US$ 6.2 million was signed in November 1995. The participating companies are contributing another US$ 3.5 million. The project involves MoEPP, the Chamber of Economy, the Ecological Development Fund and six Slovene companies. It will run through 1997. Table 9.9 describes its six subprojects in the six Slovene companies. Slovenia also participates in COPERNICUS, COST and EUREKA projects. Slovenia signed a memorandum with UNIDO on individual projects in the leather and furniture industries. Finally, Slovene industry has taken an active part in international branch projects.

Emergency planning for industrial accidents

In the event of technological accidents, two laboratories carry out measurements: the Ecological Laboratory, with a mobile unit at the Jo ef Stefan Institute in Ljubljana, and the Health Institute in Maribor. Preventive actions are financed from the State budget. The costs of post-accident activities are covered by the company concerned. The new insurance law will contain regulations on payment for damage.

Sustainability measures

Some major obstacles to achieving sustainability in manufacturing seem to be disappearing as a result either of market forces or of well-established management. The discontinuation of the use of iron ore, and forest management are a case in point. Various energy efficiency programmes exist, and the Ministry of Economic Affairs has also issued a decree introducing sales tax breaks on more energy-efficient products (see chapter 11). However, sustainability issues have not yet arisen regarding water availability and use (chapter 5).

9.3 Conclusions and recommendations

Conclusions

Together with a change of economic and political systems, Slovenia introduced the principle of sustainable development. It gave rise to changes in the way industry manages the environmental impact of its activities. These changes are enforced by modern environmental legislation, which is closely modelled on European Union standards and aimed at satisfying west European market requirements. In general, the approaches chosen during the transition period in this area are in line with efficiency requirements as well as with the Government's limited financial means.

The Government's long-term industrial policy includes cleaner production objectives. At present, however, the Government, having limited financial resources, is giving priority to the repair of environmental damage and end-of-pipe solutions, using the instrument of rehabilitation programmes and sanitation plans. Thus, a clearly formulated and active policy targeting the technological aspects of environmental protection does not currently exist. Such a policy could be based on the relevant parts of the National Research Programme of Slovenia and the Technology Policy of the Slovene Government (1995). Its specification should systematically complement the existing instruments through the incorporation of supportive measures, like the use of explicit technological objectives in the evaluation of rehabilitation programmes, sanitation plans or relevant public tenders. For example, co-funding of investment expenditures should primarily be channelled to those projects that optimize environmental benefits through technical change.

Rehabilitation programmes are designed for the long term. As a consequence, the proposed investments should not be limited to clean-up activities only, but should be technology-linked. A possible re-orientation of current practices in this direction would not only improve the chances of a lasting reduction in emissions of harmful substances, despite the growing economy, it would also reduce the need for end-of-pipe solutions.

Table 9.8: Projects for the phase-out of ozone-depleting substances

Company	Project description	Annual ODS use, t	Annual ODS phase-out, t	GEF Grant US$
LTH	Replacement of CFC12 and CFC 502 refrigerant with HFC 134a and HFC blends; replacement of CFC-11 blowing agent in foam with cyclopenthane	68.9	67.4	1,496,230
Gorenje Servis	Servicing of refrigerators and freezers and replacement of CFC-12 refrigerant in heat pumps with HFC-134a	11.4	11.4	125,460
Krka	Phase-out of CFCs aerosol propellants and replacement of them with dimethyl ether (DME) in perfumes and colognes and hydrocarbon aerosol in all other products	79.0	79.0	354,000
Lek	Replacement of CFCs aerosol propellants with hydrocarbon aerosol propellants in the production of pharmaceuticals	157.0	157.0	1,992,600
Trimo	Elimination of CFCs in the production of light building panels by replacing them with CO_2 based foaming agent for polyurethane adhesives	27.7	27.7	1,021,410
Labod	Replacement of CFCs with aliphatic hydrocarbons in dry cleaning	3.5	2.8	179,100

Source: World Bank, Environment Department, Global Environmental Coordination Division, Technical Support and Investment Project for the Phaseout of Ozone Depleting Substances. Global Environmental Facility Project Document. Slovenia. Washington 1995.

Charges on waste disposal and air emissions should be introduced as well. The sooner they are introduced, the more companies will be encouraged to cut pollution. However, environmental charges have generally not led to substantial changes in polluters' behaviour since they were too low to have an incentive effect. The level of all charges should be established so as to stimulate reductions in the generation of polluting substances and savings in input materials.

The planned reduction in the generation of industrial waste and its hazardous constituents is impossible without substantial changes in technologies. The Strategic Guidelines on Waste Management should be supported by regulations and put into practice as soon as possible (especially as far as the economic measures are concerned). The Strategic Plan's short-term programme provides funds for industrial waste utilization. A strategy to promote the use of waste as secondary raw material could be a basis for the development of the medium-term programme.

The leading Slovene companies have incorporated cleaner production targets into their development policy. They have adjusted their environmental policy to the requirements of EU markets. For other, non-export, companies, powerful incentives for the introduction of cleaner production do not exist at present (see also chapter 8). Likewise, there are no regulations on supporting measures, such as environmental management systems or eco-labelling. It could also be helpful to promote, where adequate, the use of eco-auditing and of life-cycle analyses.

Nevertheless, some of the measures taken in industry are yielding results, like the elimination of CFCs from most products and production processes. This positive example can be attributed to successful cooperation between the Government, the Chamber of Economy and individual companies under the pressure of international commitments. Some of the companies have succeeded in reducing both power consumption and the generation of harmful substances. A wider application of cleaner, safer and less resource-intensive technologies could be facilitated by a more structured provision of technological information to SMEs. The Chamber of Economy has taken a number of useful initiatives in this direction and could be encouraged to complement them further.

The main obstacles to a more systematic introduction of cleaner production in industry seem to be:

- The lack of stringent regulations in some areas (e.g. waste-water and waste management) to ensure effective reductions of pollution at the source;
- The lax enforcement of existing regulations;
- The limited or insufficient economic instruments (e.g. charges too low);
- The lack of mechanisms to encourage cleaner technologies rather than end-of-pipe solutions;
- The lack of incentives to introduce cleaner production;
- The lack of financial resources;
- The lack of demand for cleaner products on the domestic market;
- The lack of coordination between the MoEPP and the Ministry of Economic Affairs in matters of cleaner and more sustainable technologies;
- The low energy and water prices, which do not encourage enough reduction in energy and water consumption;
- The lack of information, training and education concerning cleaner and less resource-intensive production; and
- The lack of a systematic approach to the introduction of EMAS, eco-labelling and other auxiliary measures.

The policy and management regarding the evaluation of environmental impact and handling - as distinct from prevention - of emergency situations appear generally adequate. The drawing up of a comprehensive policy for accident prevention is required. Improvements could perhaps be made, if the analysis were not limited to new facilities only, but also served as a basis for the resolution of problems caused by old waste dumps (especially illegal ones), as well as other existing sources of significant adverse impact on the environment. The EIA procedure could become the basis for the closure and conversion of the sites involved. Finally, the existence of adequate industrial provisions aimed at both preventing and responding to accidents may need to be verified.

No major problems regarding the use of natural resources have so far occurred in the transition. The sustainability of current forest management practices, for instance, is beyond doubt. However, there are early signs that economic activity might cross the threshold where sustainability issues will start to matter. Thus, the environmental policy should encourage a reduction in the use of energy and raw materials. In particular, low-cost projects and process modifications intended to close water cycles in industrial companies should be promoted.

Recommendations

Recommendation 9.1:

The full potential of voluntary agreements with industry should be used in order to maximize industry's actions to protect the environment. Environmental standards - in analogy with EU standards - should be set at such levels that they bring about measures to diminish pollution at the source, as well as reductions of inputs of raw materials and energy into industrial processes.

Recommendation 9.2:

Technological improvement should be a priority criterion in the evaluation of sanitation plans or rehabilitation programmes, as well as in all relevant public tendering.

Recommendation 9.3:

The system of environmental charges and taxes should be extended to air pollution and waste generation. The charges and taxes should be set at a level that stimulates technological change leading to less pollution and to savings in the use of material inputs into production.

Recommendation 9.4:

The necessary regulations for eco-labelling and awards for achievements in environmental protection should be issued as a matter of priority, aiming at the introduction of EMAS at the earliest possible time. The standards of the ISO 14000 series should be adopted by the Institute for Quality and Metrics. The MoEPP should promote the actual introduction of environmental management systems.

Recommendation 9.5:

A 'clean technologies information centre' should be created, preferably within the Chamber of Economy. Its main tasks would be to compile and disseminate - primarily to SMEs - information on cleaner technologies and help their introduction with supporting measures. Ways should be sought to facilitate the financing of environmentally friendly and possibly small investments that pay back over relatively short periods of time, primarily owing to their export potential to EU markets.

Recommendation 9.6:

The introduction of closed water circuits in industrial establishments should be promoted.

Chapter 10

ENVIRONMENTAL CONCERNS IN AGRICULTURE

10.1 Agriculture and environmental issues

Natural resources

Natural agricultural resources in Slovenia show a great variety of conditions but, compared to fertile areas of Europe, are unfavourable. The climate is rainy and cool, except in the North-East and the South-West. The topography is hilly or mountainous. Apart from the 53% of the territory covered with forests, approximately two-thirds of the agricultural land (862,430 ha) is covered with natural grassland (147,600 ha of meadows and 353,600 ha of pastures) (see fig. I.2). These areas occupy a central position in the production system of the small family holdings where mixed stock farming predominates. Maize for silage is grown in the plains and in the hilly regions, as are potatoes for consumption on the farm (humans and pigs) and direct sale. Arable land, situated in the plains (Pomursko, Mariborsko, Celjsko), accounts for about 15% of the agricultural land. Wheat of bread-making quality and corn (maize, wheat) for animal feed are grown, as well as sugar beet. Orchards and vineyards are generally on slopes. Hops and grapes are the main perennial crops.

The conditions for agricultural activity are therefore similar to those in Austria or Switzerland.

Sectoral structures

Since 1948, the weight of agriculture in the Slovene economy and society has declined continuously. The role of the agricultural sector in the economy is marginal, accounting for less than 5% of GDP. Its share in employment had dropped from 54% to 10.7% by the early 1990s. The percentage of farmers in the population fell from 31.6% in 1961 to 7.6% in 1991. Of the general farm land (88% of arable land), 83% is privately owned, mostly devoted to cattle breeding (dairy cows, some beef), while 8% is cultivated by "socially owned" holdings, focusing on the main arable crops (wheat and corn), hops and intensive livestock breeding (pigs and poultry). Mechanization is very advanced, especially among small private farmers, who own most of the country's harvesting machinery.

The Land Property Law of May 1953 limited the size of private farms to 10 ha of arable land (or 15 ha of agricultural land). This prevented the process of land concentration for 35 years, so that in 1991 the average size of the Slovene farm was 5.9 ha (including woodland), with 3.2 ha agricultural land, of which 2.5 ha arable land. The land was fragmented into small holdings with dispersed plots. The farmer of such a holding had on average five head of cattle or three cows.

As a consequence, most of the farmers were part-time farmers, with another income. About half (48.5%) the Slovenes live in the countryside and 25% of the population is recorded as being involved in farming activities to some extent. Full-time farmers (i.e. farming being their only source of income) account for only 12%, and of these only 3% have received some agricultural training. Slovenia's agricultural structure is therefore similar to that of Poland, which also kept a dominant private sector in agriculture, in contrast with other countries in eastern Europe, where nearly all cultivated land was in the hands of collective or State farms and which are now de-collectivizing agriculture and restoring private property rights.

Table 10.1: Current farm structures, 1994

	Cooperatives and State farms		**Private farms**	
	Share in agricultural area (%)	**Average size** (ha)	**Share in agricultural area** (%)	**Average size** (ha)
Slovenia	**7**	**300**	**93**	**4.1**
Poland	22	2000	78	6.7
Hungary	62	1800	38	1.9

Source: The European Commission - Directorate for Agriculture (1994).

Production

Overall productivity is low compared to that of family farms in western Europe, owing to the difficult production conditions, and to the farms' small size and dispersion. Productivity and production growth were much higher in State-run agriculture than in the

private sector, so that 30% of the marketed output came from less than 8% of the units of agricultural area (UAA).

In 1994, the share of agricultural production was 4.9% of GDP. Production for subsistence and local markets was very important: before independence, 60% of the farmers did not use trade links (cooperatives) to market their produce. In 1994, the country was between 50 and 60% self-sufficient for most crops, except potatoes (101%). Slovenia is a net importer of foodstuffs, with EU countries supplying almost 40% of food imports. Milk production has traditionally been a surplus sector (116%).

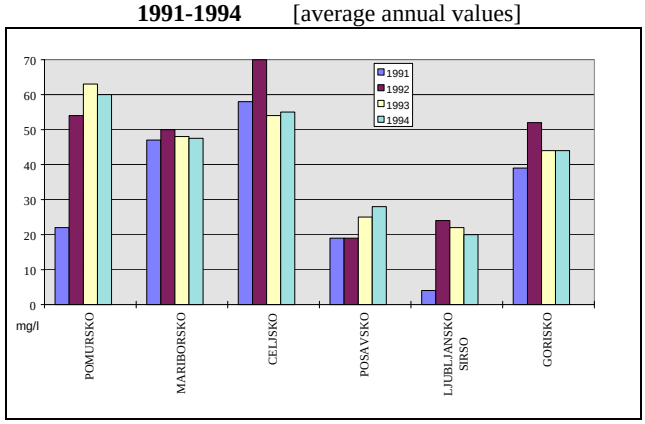
Like all economic sectors, Slovenia's agriculture had to face the collapse of its traditional export market in the former Yugoslavia especially for red meat (cattle) and poultry, although this market still represents 50% of Slovenia's agricultural exports. Since 1991, Slovenia's exports have shifted increasingly towards western Europe. The EU at present accounts for 25.9% of the country's food exports. That means adapting to the demands (types of product, quality, environmental production standards) of the western European market and to EU market rules. Slovenia hopes to maintain and develop traditional export products like hops (to Germany, United States of America).

Small farm holdings have reduced their use of fertilizers and plant protection chemicals during recent years. They are still doing so, because chemicals have to be imported from expensive west European markets.

The quality of water and soil

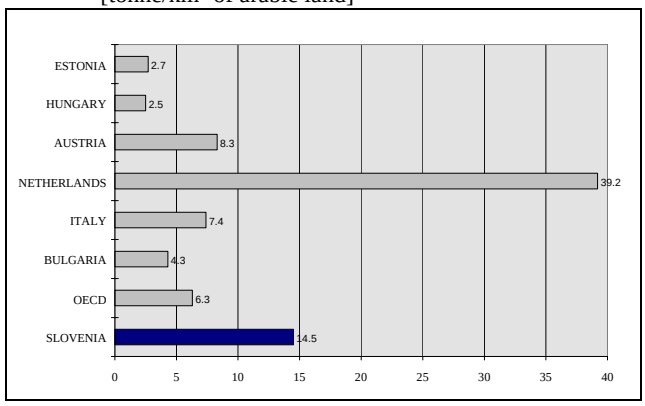
The pollution of surface and groundwaters by nitrates is considered one of the most serious environmental concerns in the context of agricultural pollution. Atrazine (banned by decree since 1996 - Official Gazette 28/96 and 34/96 -) and, more often, its metabolites DEA and DIA have also been detected. In 1995, in certain regions, the values of these substances in the water exceeded the recommended limit values of the EU. In addition, poorly managed sewage systems and waste-water treatment plants -or their mere absence -contribute to nitrate pollution in groundwaters, and it is not always easy to distinguish the share of agriculture in nitrate pollution. Nevertheless, the application of mineral fertilizers in regions with intensive agricultural land use is thought to be the main source of nitrates in the environment. The plains of Pomursko, Mariborsko (intensive field crops with cereals) and Celsko (hop plantations) are affected by this form of pollution. Manure surpluses from big livestock farms (Pomursko, Celjsko) are reported to be partly responsible for nitrate concentration in groundwater. The regions concerned are not only the most fertile, where even more intensification is planned (according to the National Irrigation Plan), but also the most densely populated.

Figure 10.1: Nitrate in groundwater of different regions, 1991-1994 [average annual values]



Source: State Monitoring of Water database, Hydrometeorological Institute of the Republic of Slovenia.
EU limit value 50 mg/l; EU quality guidance 25 mg/l.

Figure 10.2: Use of nitrogenous fertilizer in Slovenia and selected countries, 1995
[tonne/km^2 of arable land]



Source: OECD Environmental data, Compendium 1995, OECD EPR of Bulgaria, ECE EPR of Estonia and Statistical Yearbook 1995 for the Republic of Slovenia.

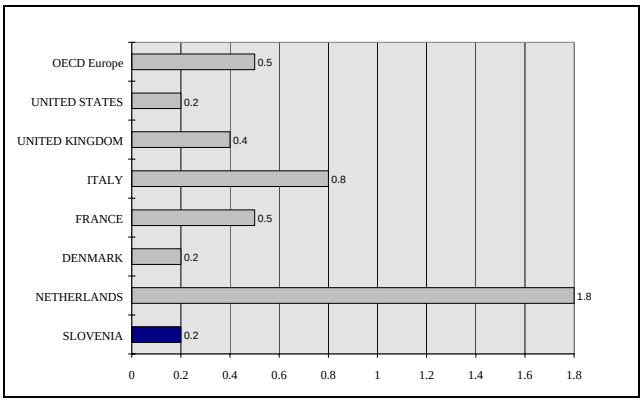
The seven aquifers under the large plains are routinely monitored. In those regions, the improvement of water quality must be given high priority in the implementation of the Environmental Protection Act. Slovenia's waters are located in the Danube basin (except for the Soča). As a partner in the Danube Environmental Programme, Slovenia has resolved to satisfy the international water quality standards that will be set.

According to the report by the Council for Environment Protection of the Republic of Slovenia, 44% of the country is vulnerable to erosion, which causes an annual loss of 2.5 million m^3 of soil. Erosion is reported in the Alpine and hilly regions. Intensive production and specialization have led to poor crop rotation systems, and a decline in natural soil fertility in areas with compaction problems.

Agriculture may be partly responsible for soil pollution. Relatively high zinc and copper concentrations occur occasionally in soil, but no connection has been shown with large-scale pig farming (zinc and copper are currently used as additives in pig feed). There is no control on heavy metals in currently used mineral fertilizers and no maximum values are specified.

Pesticides and other organic contaminants (triazine herbicides and DDT derivatives) have been detected locally, but never in high concentrations. Poor crop rotation has led to a greater prevalence of diseases, pests and weeds, and to an increased use of chemicals. The pesticides in soils of intensive agricultural use increasingly leach into the groundwater. In 1991, Slovenia ranked fourth in Europe in terms of pesticide and fertilizer consumption/ha, but overall the use of fertilizers and pesticides fell during 1989-1993 by 45% and 50% respectively.

Figure 10.3: Use of pesticides in Slovenia and selected countries, 1989-1990-1991
[tonne/km^2 of agricultural land]



Source: The Dobris Assessment Report (1995).

Landscape and biodiversity

Although more than half of Slovenia is covered by forests, agriculture and suitable agricultural methods are crucial for maintaining the diversity of landscapes and of habitats of wild species. Landscape and biodiversity are threatened both by the intensification of agriculture (plains) and by the abandonment of marginal lands unsuitable for intensive cultivation (hills and alpine regions), whose natural beauty and diversity are of special value. A field survey carried out by Slovenia's Statistical Office shows that in such areas the shift from pasture land to forest is considerable. The same is true of the shift from arable land to permanent grassland. At the same time, the maintenance of cultivation in marginal agricultural lands is considered a precondition for the preservation of landscape variety.

On the other hand, in the Pomursko and Podravsko, about 17% of registered grassland has been turned into arable land (i.e. ploughed). Bushes and grasses are a versatile group of ecosystems. The net overall result of these two opposed trends - i.e. abandoning arable land to the benefit of grassland in marginal areas and cultivation of former grassland in the plains - is a reduction in grassland.

Irrigation and intensification

Water abstraction for irrigation purposes shot up between 1980 and 1994, rising from 0.2 million m^3 to 3.4 million m^3 per year, reaching a peak of 3.9 million m^3 in the years 1985 to 1990. Between 1992 and 1994, drought caused poor harvests.

10.2 Policy formulation and implementation

Legal instruments

The Environmental Protection Act provides a general, wide-ranging instrument for the protection of the environment. Most of its basic principles are relevant to agriculture:

- The establishment of efficient environmental monitoring and the application of the polluter-pays-principle ensure that agricultural polluters can be ordered to pay fines. Similarly, rehabilitation programmes may be prescribed in order to reduce or stop pollution from agricultural activities.
- The principle of environmental vulnerability studies and of environmental impact assessments (EIAs) aims at determining the environmental acceptability of any new project in a specific location. This is relevant to every land improvement project (irrigation, drainage, land reapportionment, agricultural buildings for any

purpose, livestock farms). Environmental topics treated in these EIAs are water protection (drainage, irrigation, livestock farms), protection of the air (smell) and against noise (ventilation systems), protection of the landscape (land melioration projects, agricultural buildings) and of biodiversity (land melioration).

- The principle of environmental research will have to be applied to agronomic research whose objectives are not only to increase physical and economic yields, but also develop environmentally friendly agricultural techniques.
- The principle of public expenditure relating to environmental protection, together with the establishment of an environmental protection fund will provide funds for ecological and agronomic research and extension services that provide ecological information.
- The principle of public participation is designed to inform the public about the evaluation of specific projects from an environmental point of view. Current results of monitoring activities and ecological achievements are available to the public through an environmental report, based on an environmental information system.

According to the recently adopted Regulation on Environmental Impact Assessments, land melioration projects or rural constructions above a certain size are subject to EIA. Land consolidation - i.e. merging of individual plots - projects are not subject to EIA.

Maximum concentration levels for atrazine and heavy metals have been established. The new ordinance on the critical values in the soil fixes maximum and critical values for a number of chemicals. The new ordinance on emissions of substances in the soil regulates the application of fertilizers, both mineral and organic. It aims at promoting good agricultural practices in order to reduce leaching of nutrients (especially in regions with shallow groundwater or in catchment areas for drinking water), to adapt the level of fertilization (testing the available nitrogen before fertilizing, application during the growing season, winter intercalary crops), and to limit the number of head of cattle on agricultural land (LU/ha). The use of sewage sludge in agriculture is also regulated, and there will be rules governing the concentration values for heavy metals - which are urgently needed, because of the planned increase in the number of the municipal waste-water treatment plants.

The implementation of the Plant Protection Act will make it possible to strictly supervise the trade and use of pesticides. In future, triazine and its derivatives will no longer be used in agriculture.

Strategies

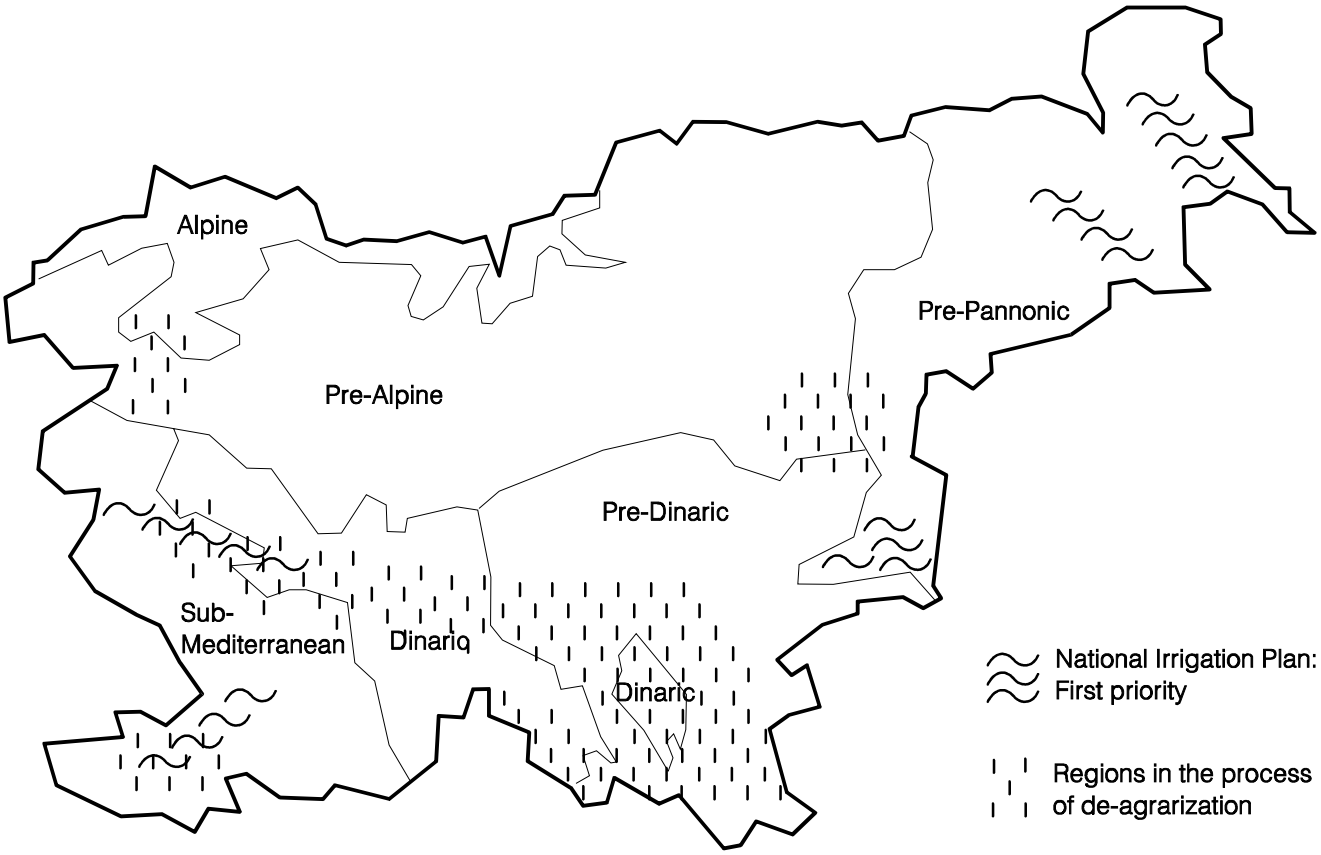
"Economically oriented sustainable agriculture", under this motto Slovenia defined a strategy for its agricultural development with a target scenario. Its aims are to produce high-quality cheap food, ensure food security (food availability, balanced food supply), improve competitiveness, adapt agricultural production to marketing possibilities, but also to preserve rural population densities, make sure that agricultural production is compatible with natural resources, preserve all agricultural land (to forestall any interruption in supply), protect agricultural land and water from pollution and misuse (sustainable soil production potential, ecologically sound agricultural production).

The National Programme of Irrigation, implemented by the Ministry of Agriculture, Forestry and Food, aims at increasing the country's irrigation capacity. With the assistance of the World Bank, about 10,000 ha will be irrigated mainly in the Vipava valley (3,000 ha), in the north eastern plains and on the Mediterranean coast. Irrigation projects larger than 10 ha are subject to an EIA, which is the case with these projects.

Slovenia estimates that long-term agricultural development will be possible only under conditions similar to those prevailing in other European countries. The country encourages the development of agricultural holdings of an "economically viable size". Greater productivity on private farms is expected from the abolition of the limitation of their maximum size, the concentration of land use and a decrease in the number of farms. The aim is that 70% of the land should belong to farms larger than 15 ha. The further development of the extension service and its functional improvement are envisaged, as is the expansion of the arable area through land improvement.

A marked shift from the livestock to the crop sector (wheat, sugar beet) occurred between 1989 and 1993. Cattle herds will partially switch from milk to beef production, as a consequence of the higher productivity of dairy cows and herd specialization in a limited market for dairy products.

Figure 10.4: De-agrarization and irrigation



Case-study: Large pig farms in Slovenia

In 1993-94, Slovenia produced 66% of its pork consumption. Pig production for the home market is very attractive, due to the availability of cheap imported pig feed and to import levies on pig meat. This led to an increase in pig meat production and pig herds between 1992 and 1994. In 1995, Slovenia produced about 570,000 pigs: 58% of them on very small private farms (2.1 pigs/farm), often for subsistence. The other 42% are produced by eight large, formerly socially owned farms, mostly located in the north eastern plains.

To solve the problems of waste-water treatment, slurry and smells, one pig farm installed a waste-water pre-treatment plant. This was connected to the municipal waste-water treatment plant, which produced concentrated slurry. For another pig farm, located along a river, a pilot project was developed within the Strategic Action Plan for the Danube River basin. It involved pre-treating the slurry, neutralizing its smell before using it for irrigation in the vicinity of the farm. The system was not satisfactory because of defective storage and treatment equipment and inappropriate disposal of the slurry on the fields.

Because none of the farms has until now met the quality requirements for treated waste water at the point of outflow into surface waters, the Ministry of Agriculture's policy is to support the development of pig production on family farms and the redistribution of stands for porkers on large farms, on condition that they meet the environmental requirements, prescribed by the legislation (no more than 2 LU/ha and adequate equipment for the storage of the manure). The State gives grants for the construction of stands for porkers that cover one third of their construction cost. For instance, from the farm where the unsuccessful pilot project was undertaken, 12,000 stands were redistributed, between 1993 and 1995, to 60-70 smaller stables.

On the other hand, the Slovene Government is aware that the difficult conditions faced by most of the country's agriculture and its continuing external functions (social and environmental) call for a whole series of intervention policies, strong incentives and financial support.

Implementation and institutions

The mechanisms used by the Government to support domestic agriculture include a price fixing policy for wheat, milk and sugar, preferential low-interest loans for farm investment, export aid, and direct aid for milk producers in less-favoured areas.

The extension service appears to be very efficient. Founded by the cooperatives, it is now run and financed by the Ministry of Agriculture. This Ministry ensures the continuous training of all agricultural extension officers in order to familiarize them with the new environmental legislation. The extension officers' training has to comprise a large range of sound agricultural practices and their effects on the environment, the limit values, and the practical and legal effect of the enforcement of the laws, so that they can transmit comprehensive and correct information to the farmers. The same will apply to the technical aspects of «landscape cultivation», as soon as the habitats of traditional agricultural landscapes are protected by law and/or encouraged by financial incentives.

The risk of water pollution with nutrients is largely linked to pig farms (see case-study box). The optimal size of such farms is currently under discussion in Slovenia. This debate is supplemented by efforts to find generally applicable solutions to waste-water treatment.

Slovenia's natural beauty is attributable largely to its biodiversity and the variety of its landscape, which make the country attractive for tourism. One of Slovenia's objectives is to preserve the full cultivation of agricultural land in sparsely populated areas by supporting the (small) farmers in those regions. The switch from a subsidy per litre of milk produced to a subsidy related to the number of head of cattle was intended to encourage the raising of more cattle, thus creating a greater need for grassland. The Ministry of Agriculture also hopes that the concentration of the land in the hands of fewer farmers will enable them to take proper care of it.

In spite of a severe drop in the number of tourists in 1991, tourism is one of the strategic sectors of development. Conservation of the landscapes and of preserved natural areas outside nature reserves forms the basis of tourist development schemes. The success of such schemes, however, cannot be achieved without the collaboration of local agriculture and the farmers' respect for their environment. It is therefore essential to take their interests into account.

The mapping of habitats according to a method used in Bavaria is being planned; a rough survey exists already. A related project was proposed for PHARE funding, but rejected. The preservation of landscape diversity and habitats, particularly in agriculturally marginal areas, depends to a large extent on the attitude of individual farmers - which is largely dominated by their economic prospects.

Case-study: Agriculture, environment and tourism

The more marginal the agricultural land, the more interesting it is from the point of view of landscape and biodiversity (Karst, Alps), and the more incentives are needed to maintain a rural population. Incentives may take various forms of payments by the State, but in addition appropriate labelling will have to be introduced for agricultural products including the use of eco-labels and the registered designation of origin (AOC). These special products can be promoted through the regional tourist boards and add to the tourist attraction of the region. Local farmers can also participate in the region's tourist development and offer various agro-tourist services. Efforts are already made locally as well as nationally («*holidays on the farm*»). Possibilities for members of farming communities to earn an off-farm income can help to maintain a rural population. The "Renewal of countryside and villages" Programme will make an essential contribution by developing integrated programmes.

Tourism is concentrated in the summer months and in the coastal and alpine regions. Moreover, Slovenia receives large numbers of day-trippers, who add to the pollution of the environment and pressure on the land. Developing «green tourism» to spread tourism both over time and geographically could partially solve that problem.

Illustrative excursion: The private farm of Mr. X.

Mr. X. and his parents operate a dairy farm of 20 ha (6.5 ha are rented) and 18 ha of forest, in the vicinity of Ljubljana. On the shallow karstic soil (400 m altitude), he grows 1.0 ha of cereals, 1.0 ha of potatoes, the rest consisting of temporary grass (in the crop rotation) and permanent grassland. Between cereals and potatoes, Mr. X. grows an intercalary crop to feed the cows. Maize for silage (4.0 ha) and some for grain (0.5 ha) are cultivated exclusively on a nearby moor (unsuitable for grass because of the high prevalence of the weed *Equisetum pratense* that is toxic for bovine cattle). Mr. X. has 14 Simmental cows and their calves, four animals for fattening and three pigs, on the whole about 1.0 LU/ha.

By Slovene standards, Mr. X. cultivates a fairly large farm. He belongs to the minority of full-time farmers. His current plan is to intensify milk production both by breeding his cattle for milk and by intensifying the cultivation of his permanent grasslands (re-sowing them with more productive grass species). He wants to diminish beef fattening because of the instability of the market. Mr. X. would be in favour of a land consolidation project in his village, because larger plots round his farm would allow him to build a new stable and to improve mechanized cultivation. He has already bought plots from neighbours and intends to remove the stone heaps that mark the ancient boundaries. The village gives substantial financial help for breaking those stones to fill potholes. In western Europe, such stone heaps are considered as habitats of high value for rare species (reptiles). Mr. X. would be ready to keep them in return for appropriate financial compensation.

Mr. X. is aware of the external functions of his farming, but he thinks that, with the current government policy, his survival as a farmer will depend on the successful intensification of his farming operations.

10.3 Conclusions and recommendations

Conclusions

Slovene legislation does not mention the ecological function of agriculture and no financial incentives are envisaged for less environmentally harmful production systems. Extending the legal instruments to this purpose would highlight the government's efforts to ensure the provision of good-quality food to the population, and protect landscape, soil and water.

Slovenia's objective is to maintain a "multipurpose agriculture". The change of structure is not yet complete. Slovenia still faces many choices and may make better ones than west European countries. There is a general concern about the future of small-scale agriculture, if and when Slovenia joins the EU. A study has concluded that the Common Agricultural Policy would, on the whole, be favourable to Slovene farmers, because the external functions of agriculture would be financed with EU resources. Slovenia's own resources fall short of what would be needed for direct payments.

There is an urgent need for the Ministry of Agriculture and the MoEPP to provide the legal framework for the awarding of eco-labels, which are foreseen in the EPA. Labelling should promote and protect low input traditional farming systems and food processing on the European market. The legislation should be modelled on the European legislation for organic farming (No 2092/91) and for the registered designation of origin (AOC) (No 2081/92). It should include specification for a label indicating not only farming systems (organic or integrated) but also origin, use of local varieties, traditional food processing on the farm, and protection of habitats of traditional agricultural landscapes. According to the EPA, the eco-label is awarded by the MoEPP. The Ministry of Agriculture will have to study and support suitable strategies for the marketing of labelled products.

To ensure the smooth and efficient implementation of the above and other recommendations for the integration of agricultural and environmental decision-making, the two ministries should consider exchanging officers, as suggested in the OECD report on agricultural and environmental policies.

Relatively low incomes in agriculture, together with the expected dynamic economic growth (5% per year until 2000), may convince young people to leave agriculture. As a result, the number of farmers can be expected to decline further, and the size of farms to increase. Through the combined effect of higher productivity and the concentration of activities on more productive lands, marginal areas in Slovenia would increasingly be left uncultivated and abandoned to forest growth. Countermeasures are required, if the diversity of Slovene landscapes and biodiversity are to be preserved.

A report issued by the European Environmental Bureau in Brussels has criticized programmes aiming

Table 10.2: General review of geographical regions and their relationship to agricultural activities

Geographical region	Type of agriculture	Environmental risks	Suggested measures
Marginal areas with extensive agriculture			
- High Alps - Karst and sub-Mediterranean - Alpine foreland and hills	Small family holdings Staged agriculture (moving cattle) Bovine cattle	Loss of population and abandoned marginal areas	Maintaining at least a minimum size of population: State support, social help. Developing «*green*» tourism and agro-tourism. "Renewal of countryside and villages" Programmes.
Lowlands with intensive agriculture			
- Intramontane depressions : • Lubljansk. • Celjsko • Vipava - Sub-pannonian region : • Mariborsko • Pomursko	Small family holdings (bovine cattle) *and* large socially owned holdings *with*: - Pig units on family farms and large pig farms	- Water pollution (N, P)	Checking minimum plot size for disposal of liquid animal waste ; ensuring adequate storage capacity for such waste ; supervising the spreading of such waste (recorded in books) ; contracts for transfering such waste between livestock farms and farms with capacity for spreading the waste on fields : information by extension service and legal enforcement. Possibly closing down livestock farms.
	- Intensive crops (cereals, corn)	- Water pollution (N, pesticides) - Decrease of soil fertility - Treatment of crops due to increase in pests and diseases - Soil compaction	Better diversified crop rotation. Winter intercalary crops. Control of use of fertilizers and chemicals : « integrated » production systems. Information through extension service and legal enforcement based on results of monitoring.
		- Land melioration and land consolidation - Large irrigation projects	« Ecological compensation » with legal enforcement.

at "modernizing" and "westernizing" Polish agriculture, whose structure is similar to that of Slovenia. Small farm holdings provide much employment, are environmentally friendly (low use of inputs, maintenance of landscape and habitats, like boundary hedges), do not produce surpluses, and are not as heavily subsidized by the State. The non-governmental authors of the "Agenda 21 for Slovenia" have a similar approach to the problem and express concern about the intensification of Slovene agriculture.

Large-scale farmers, with their more advanced training, can make more appropriate use of inputs.

Very large farms are reported to be keeping track of all their measures and procedures. Nevertheless, coordinated efforts are needed to tackle pesticide and fertilizer overuse. Enforcing the new regulations on the use of fertilizers and the actual observance of «the code of good agricultural practices» (Law on Agricultural Land) will help to reduce the leaching of nitrates and pesticides into the groundwater. But in regions where maize and sugar beet are important (Intramontane depression and sub-pannonian region - see table 10.2), it will be necessary to rethink the type of crops and crop rotation: maize and sugar leave the soil bare for the whole winter (their harvest comes too late for the proper growth of an intercalary crop), and bare soil facilitates the leaching of chemicals (nitrogen) into groundwater. In protection zones of drinking water abstraction sites, only permanent grassland should be allowed, and fertilization

Table 10.3: Specific regional problems due to agricultural activities

Geographical region	Type of production	Environmental risks	Suggested measures
- High Alps	Small family holdings	- Erosion →	- Reforestation.
		- Water pollution (N, P) →	- Maintaining extensive agriculture (control and legal enforcement of cattle units and use of pesticides and fertilizers). - No pig or poultry units to develop.
- Karst and sub-Mediterranean	Small family holdings Pig production on farms	- Water pollution (N, P) →	- Checking of minimum size plots for disposal of liquid animal waste ; ensuring adequate storage capacity for such waste ; supervision of the spreading of such waste (recorded in books) : information by extension service and legal enforcement.
- Alpine foreland and hills	Small family holdings	- Erosion →	- Better crop rotation. Winter crops. Maintaining or planting bushes and trees.
- Lubljansko	Maize on drained swamps	- Soil degradation →	- Better diversified crop rotation. Winter crops. Regulation of the water level.
- Celjsko	Intensive hop cultivation farms	- Water pollution (N, pesticides) →	Mulch in hop - plantations; "*Integrated*" production systems.
- Vipava valley	Intensive crops	- Large irrigation project - Wind erosion →	«*Ecological compensation*» (bushes and trees) with legal enforcement.

prohibited. In protection zones, financial compensation should be granted to the affected farmers. Regarding pesticides, the establishment of registration procedures should be complemented by measures encouraging, where appropriate, fewer applications, and switchching to less potentially harmful alternatives and/or to integrated pest management.

«Good agricultural practice» is an integrated approach that ensures better protection of both the soil from compaction or fertility decrease and groundwater from leached chemicals. The technological investment in better practices is extremely low. What is needed is, rather, a change of practices and sound technical knowledge on the part of farmers, who ought to be able to rely on the active consultancy provided by the extension service.

The regular monitoring of groundwater sources may, to some extent, produce evidence of the improvement in agricultural practices in protection zones of abstraction sites.

From the environmental point of view, large pig farms (Pomorsko, Celjsko) can be considered like a processing industry that has to comply with environmental requirements for both the treatment of waste water and the emission of odours. Even if these industrial farms intend to adapt regularly to the stricter requirements for waste-water treatment, the concentration of such large quantities of pigs complicate the reprocessing of the slurry on agricultural land. The farms will have to demonstrate that they are able not only to treat the waste water properly, but also to dispose of the slurry adequately.

The spreading small pig production units on family farms should allow for a natural recycling of the manure as a fertilizer. Nevertheless, this measure will also cause concern. The intensive family farms with pig production are already finding it hard to process their effluents (Karst and sub-Mediterranean region - table 10.3). The State will probably have to help finance the technical adjustments of the farms to conform to the regulation. There will also be a need for a good network of extension services to teach the farmers how to reprocess liquid manure on

agricultural land, and for inspectors to check the situation on all farms.

On the whole, Slovenia may have to reconsider the question of the number of pigs that can be produced in the country and the policy on import levies on pig meat and pig feed. It would also be of interest to examine the poultry sector from the environmental point of view.

Slovenes have long been aware of the beauty and diversity of their country. Their Nature Conservation Act (1970) was replaced by the Natural and Cultural Heritage Act (1976), which is still in force. Its main drawback is its lack of statutory instruments for implementing its provisions and of modalities for management and compensation. Perhaps the development of comprehensive spatial development plans for agricultural projects could help protect landscapes.

At present, there is no legal protection for natural habitats on agricultural land, and no particular concern, because there are still so many natural objects in the Slovene countryside that they are sometimes even resented as a hindrance to modern agricultural practices. Nevertheless, it is generally admitted that the disappearance of trees, bushes and hedges has aggravated wind erosion in the Vipava valley and that wetlands are threatened in the north-eastern plains (table 10.3).

In the framework of land melioration projects, EIAs should make provision not only for conservation or compensation, but also for the rehabilitation of habitats, in proportion to the benefit expected from the land melioration project.

Water abstraction for irrigation affects the local and regional water balance. NGOs are concerned that a drop in the groundwater level may cause drought, affecting valuable biotopes, and disturbing natural water cycles. Moreover, large-scale irrigation projects (Lowlands with intensive agriculture - table 10.2) also presuppose land consolidation , land consolidation and reshaping of plots, all of which endanger natural habitats on agricultural land.

By launching the Programme «Renewal of countryside and villages», the Ministry of Agriculture created an instrument for comprehensive countryside development, based on local demands. Within that framework, the needs and the ambitions of part-time farmers with respect to agricultural issues, as well as the suggestions of NGOs, should be taken seriously into account, especially in regions where industry is going through a restructuring process that is causing unemployment. The comprehensive approach proposed for the Triglav National Park (see chapter 7) could be extended and adapted to all agriculturally marginal areas of Slovenia. Arguably, the few subsidies for agricultural activities (related to the number of head of cattle and cows registered in the herdbook) in those regions might more profitably be granted for purely environmental purposes (ha of mowed meadows).

A synopsis containing both regional overviews of agricultural practices and risks, as well as further suggested measures, is included in tables 10.2 and 10.3.

Recommendation 10.1:

The ecological function (as well as the impacts) of agriculture should be recognized in appropriate legal instruments, so that financial incentives can be offered for production systems that cause less environmental stress. The use of e.g. organic farming systems could be furthered in this connection, and should be labelled appropriately.

Recommendation 10.2:

The legal instruments for introducing eco-labelling and showing the registered designation of origin (AOC) for agricultural products should be created as a matter of urgency.

Recommendation 10.3:

The quality of groundwater in agricultural areas should be regularly monitored so as to detect agricultural sources of groundwater pollution.

Recommendation 10.4:

In zones being protected for drinking-water abstraction, only permanent grassland should be allowed as agricultural land use, and its fertilization should be limited.

Recommendation 10.5:

A comprehensive programme should be developed to support farms in agriculturally marginal areas, combining economic incentives with landscape and biodiversity preservation targets. The programme could be based on an adaptation of the Natural and Cultural Heritage Act, taking into account the requirements of the biodiversity strategy. *(See also Recommendation 7.5)*

Chapter 11

ENVIRONMENTAL CONCERNS IN ENERGY

11.1 Energy production and use

Primary energy supply

Upon independence, Slovenia became a net importer of energy. In 1994, the country imported 56% of its primary energy requirements. Table 11.1 shows the structure of primary supply from 1992 to 1994. Coal and nuclear energy represent the main primary energy input into the indigenous production of energy. Half of the nuclear electricity is exported to Croatia, the co-owner of the Krško nuclear power plant. The overall primary energy supply increased over the period, mainly from imports of petroleum products and the generation of nuclear electricity. The rising demand for petroleum products is due to the expansion of road transport.

The plan for the future (until 2010) development of energy as well as the forecast of national growth predict a decrease in the use of coal, a stable nuclear energy production, and an increase in the use of oil, gas and hydropower.

The energy industries

In 1995, energy was produced by conventional thermal power plants (TPP), combined heat and power plants (CHP), heating plants (HP), hydropower plants (HPP), a nuclear power plant (NPP), and one refinery, currently meeting approximately 10 to 30% of domestic needs, depending on the type of petroleum product.

Table 11.1: Primary energy supply* [thousand TOE]

	1992	**1993**	**1994**
Electricity	-156	-122	-166
Coal	1322	1308	1214
Crude oil	609	588	392
Petroleum products	1010	1350	1696
Gas	527	527	540
Nuclear	1035	1031	1199
Hydropower	293	260	292
Total	**4640**	**4942**	**5167**

Source: International Energy Agency (IEA), Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

*Assessed in accordance with standard OECD/IEA methodology, i.e. nuclear electricity assessed at primary energy equivalent, assuming a 33% conversion efficiency, and hydropower assessed in terms of energy content.

As oil refining constitutes only a small industry, electricity and district heat generation represent the main energy transformation processes. Co-generation is more important as a source of district heat than heating plants. Nuclear fuel is the most important input fuel into electricity generation, and its share increased between 1992 and 1994. Coal represents the main input into co-generation of power and heat (fig. 11.1), while natural gas is the main energy source of heating plants (fig. 11.2).

Table 11.2: Current and predicted electric power generating capacity [MW]

Primary energy sources	Coal	Oil	Gas	Nuclear	Hydro	Total
High-growth scenario						
31 December 1994	877	122	21	632	751	2405*
31 December 1995	872	101	42	632	762	2409
31 December 2000	866	101	42	674	978	2661
31 December 2005	822	169	440	674	1058	3163
31 December 2010	822	184	440	674	1111	3231
Low-growth scenario						
31 December 2010	637	184	303	674	1111	2909

Source: Ministry of Economic Affairs of Slovenia, quoted in IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

* Data are only for public power plants (2405 MW); industrial and other small power plants production represented 130 MW in 1994, and the total 2537 MW.

Figure 11.1: Primary energy consumption and heat and electricity production at combined heat and power plants

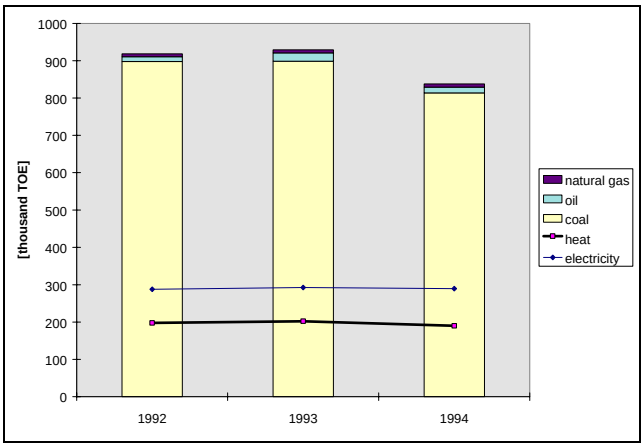
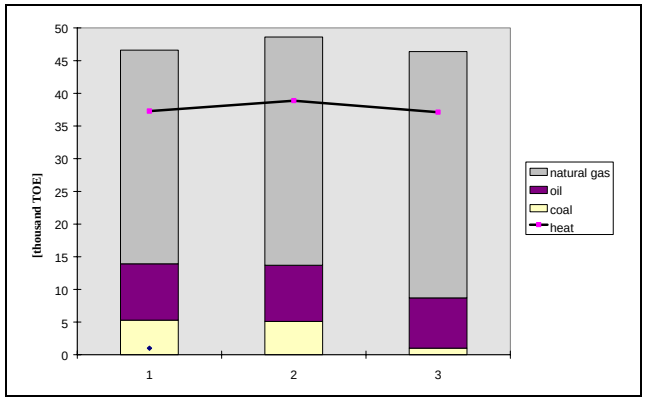


Figure 11.2: Primary energy consumption and heat production in heating plants



Source: IEA, Energy Policies of Slovenia. 1996 Survey.Paris. 1996.

Table 11.3: Final energy consumption [thousand TOE]

	1992	**1993**	**1994**
Industry sector	1064	1015	1079
Transport sector	904	1091	1216
Agriculture, commerce and households	1032	1162	1135
Non-energy use	13	9	8
Total final consumption	**3013**	**3277**	**3438**

Source: IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

Final consumption and energy intensity

Final consumption of energy increased between 1992 and 1994 (table 11.3), primarily because of growing transport (see chapter 12).

The energy intensity per unit of GDP (calculated as total primary energy supply (TPES) divided by GDP) is higher than in OECD Europe, but lower than in other transition countries (see table 11.4). The energy intensity per capita (calculated as TPES divided by total population) is lower than in western Europe. The difference in energy intensity per unit of output as compared to OECD member countries can generally be explained by the continued use of highly energy-intensive industrial processes, together with a currrently low degree of industrial capacity utilization. If this is typical of the transition process, the figures suggest that Slovenia has managed to develop comparative advantages over other countries in transition in terms of one or both of these factors. The lower per capita primary energy consumption can be explained by the comparatively lower energy use in the transport and household sectors.

Sectoral characteristics

Industry. The economic recession resulted in a relative decrease in energy consumption. The share of industry in energy consumption was 42% in 1990 and 31% in 1993, close to west European values. Nevertheless, total energy demand increased in 1994 by 6%, together with GDP. In the early 1990s, Slovenia's industrial structure relied mostly on the resource-intensive industrial sector (see chapter 9). Since then, it has moved closer to that of the west European countries (table 11.4)

Industry has been the target of many energy efficiency programmes (promotional and educational) to raise awareness about the importance of the efficiency concept and its environmental advantages. Support was given by the Government through the Investment Support Scheme and subsidies on energy audits.

Residential sector. Most buildings in Slovenia have insufficient wall insulation. Seventy per cent are of classic brick construction with limited thermal insulation properties. Buildings are heated either by individual or by district heating. As shown in table 11.5, liquid fuels are the most widely used energy carriers for individual heating. District heating still largely relies on coal as an energy source, although its share dropped from 63% to 10% between 1989 and 1993. District heating is mostly located in large cities. It represents 15% of final energy consumption by households.

Table 11.4: Energy intensity in OECD countries, transition economies and Slovenia [TPES]

		1990	1991	1992	1993	1994	1995
Slovenia	[TOE/thousand US$]	0.30	0.32	0.31	0.32	0.29	0.30
OECD Europe	[TOE/thousand US$]	0.20	0.20	0.20	0.20	0.19	0.20
Other transition economies*		..	..	..	0.87	0.82	0.80
Slovenia	[TOE per capita]	2.61	2.52	2.32	2.48	2.60	2.76
OECD Europe	[TOE per capita]	3.29	3.34	3.28	3.29	3.27	3.29
Other transition economies*		..	..	..	2.81	2.74	2.76

Source: IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996 and IEA 1996 report on recent Energy Developments in Central and Eastern Europe.

* Values calculated as average for the Czech Republic, Hungary, Poland and the Slovak Republic.

Table 11.5: Energy consumption in the residential sector, 1994

Forms of energy	share [%]
Solid fuels	7.5
Liquid fuels	52.0
Natural gas	3.2
Electricity	22.3
District heat	15.0
Total	100.0

Source: IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

The building sector has been the target of many energy efficiency campaigns. Governmental support is given through the Investment Support Scheme and the Energy Advisory Network. The Building Code, which predates independence, is based on DIN standards.

Transport. Contrary to other end-use sectors, the policy for energy conservation is not fully developed in this sector (see chapter 12).

11.2 Environmental effects

General impacts

The main environmental features of energy production in the recent past have been:

- SO_2 emissions dropped drastically between 1994 and 1995 (see table 11.6). However, despite efforts to reduce environmental pressure from the energy transformation/production sector, it stays by far the most polluting sector in terms of SO_2 and CO_2, and is second only to the transport sector in terms of NOx emissions.
- The ashes from the combustion of fossil fuels during electricity generation are partly used to restore landscapes at the Šoštanj power plant, but are not systematically used in construction.
- Mining, oil drilling and similar energy extracting activities modify landscapes.
- There are unsolved problems related to the generation of radioactive waste and spent fuel elements. (Their storage and disposal are dealt with in chapter 6).

Emissions from fuel combustion

The combustion of fossil fuels in all forms is responsible for the largest share of air pollution. District heating and home heating using poor-quality fuels contribute to air pollution in cities. Emitted SO_2, NOx and particulates have local as well as transboundary consequences for the environment. Emission trends for 1990-1995 show an impressive decrease in SO_2 emissions, essentially due to the installation of flue gas desulphurization at the Šoštanj power plant and the increasing share of natural gas in domestic heating.

11.3 Environmental policy and management

Legislation and institutional arrangements

The Environmental Protection Act (1993) defines a framework for the use of natural resources. Furthermore, it provides the basis for environmental impact assessments. Both are important elements for

Table 11.6: Trends in air emissions from the energy sector, 1990-1995 [thousand tonnes]

	1990	1991	1992	1993	1994	1995
SO_2	154	137	153	149	145	100
NOx	17.2	15.5	16.1	16.6	16.0	16.5
CO_2	6127	-	-	-	5716	5943
CO	0.99	0.92	0.87	0.97	0.93	1.0

Source: MoEPP, Environmental Report 1995 of the Republic of Slovenia. Ljubljana 1996.

regulating energy activities. For air pollution from energy sources, the Government has passed ordinances which deal with emissions. They regulate emissions of air polluting substances from stationary sources (point sources, internal combustion engines and gas turbines).

There are different permissible levels of SO_2, CO, NOx and solids (flue ash) for existing and newly installed plants. For the latter, the ordinances are fully compatible with EU standards and provisions of Directive 88/609/EEC, and are already applicable. For existing plants, the standards and provisions of the ordinances will become mandatory according to a set schedule but no later than in the year 2004. A decree on oil products was adopted in 1995. It introduces fuel quality standards for the lead content in petrol and the sulphur content in liquid fuels.

To organize and support the energy conservation measures, an Agency for Efficient Energy Use was established within the Ministry of Economic Affairs. This Agency supervises the practical implementation of the energy conservation measures in industry and the household sector. The measures are directly applied by other institutions and private agencies. At the regional level, institutional arrangements remain voluntary.

Environmental objectives of the energy strategy

The main objectives of energy policy are contained in the Resolution on the Strategy of Energy Use and Supply of Slovenia (1996), focusing on energy conservation measures and a wider use of renewable energy sources. The Government assumes that between 1995 and 2010 energy intensity in terms of output will decline by 2.6% p.a. in the low-growth scenario, and increase by 4.6% in the high-growth scenario.

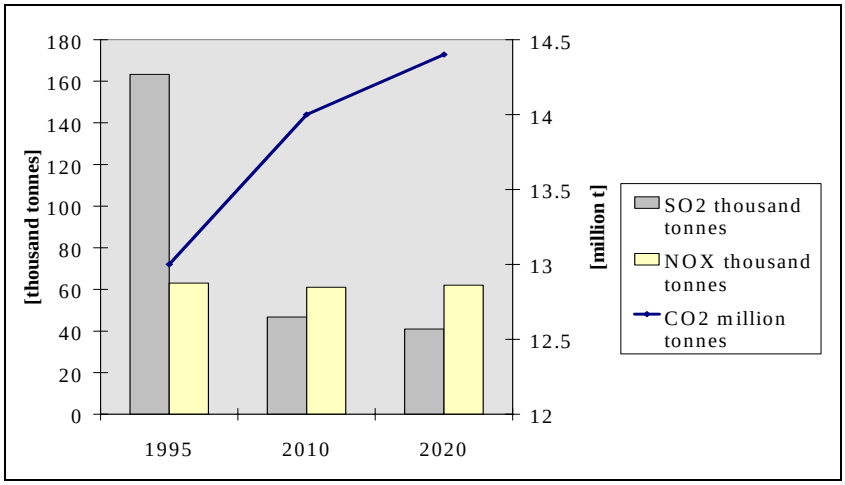
To develop the energy strategy, two emission scenarios were established, based on a high (6%) and a low (3%) GDP growth rate, respectively. The forecasts take into account the above-mentioned measures, as well as restructuring and renovation in industry. In both scenarios, SO_2 emissions will be cut to around 25% of the 1995 level (see fig. 11.3 and 11.3 bis). NOx emissions will be stabilized or drop slightly. CO_2 emissions will only decrease if the demand for energy declines, which is the case in the low-growth rate scenario.

The energy policy aims at reducing the impact of energy activities on the environment in two ways. Firstly, it aims for energy conservation. Secondly, it encourages fuel switching towards less polluting forms of energy, including the installation of abatement technologies that increase the use of renewable energy.

The objectives for environmental protection were developed in accord with the UNECE Protocol on Further Reduction of Sulphur Emissions, as well as with the European Council Directive 88/609/EEC. The objectives were set before Slovenia signed the United Nations Framework Convention on Climate Change. Thus, the full implementation of this Convention's requirements will be left to future policies. The current objectives are:

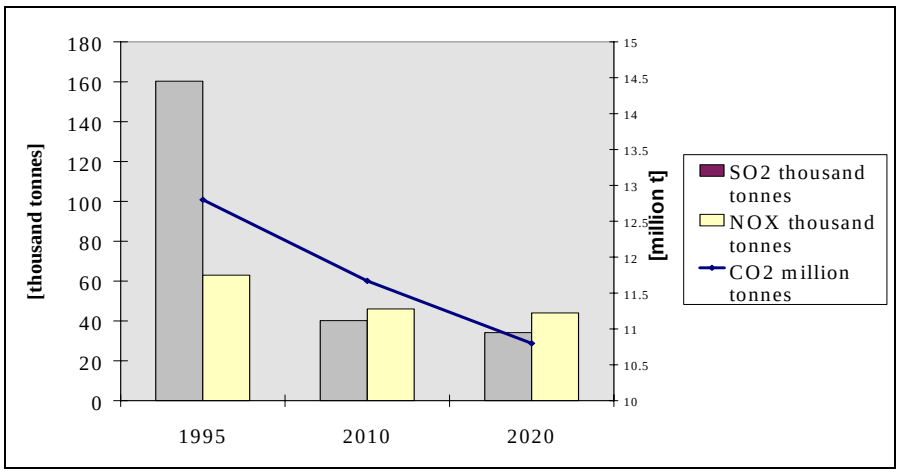
- **Sulphur dioxide emissions.** The goal is to reduce the SO_2 emissions per capita to a level comparable to that in EU countries (i.e. by approximately 60 to 65%) by 2000. To comply with international obligations in the future, Slovenia intends to reduce its SO_2 by 45% of the 1989 emission level by the year 2000.
- **Nitrogen oxides emissions.** The goal is to stabilize NOx emissions in order to remain below the level of EU countries.
- **Carbon dioxide emissions.** Similarly, the goal is to cut CO_2 emissions further in order to remain at a lower level than the EU countries.
- **Emissions of particulate matter.** The main objective is to reduce emissions in residential areas by implementing more stringent regulations and increasing the use of natural gas.
- **Solid wastes.** The final goal is to set up similar facilities for ash disposal and treatment as those found in EU countries.
- **Land restoration.** This activity is to some extent pursued during the mining process. Final recultivation and revitalization are postponed till after the respective mine is closed. It is planned that environmentally friendly processes for mining will be specified as part of the long-term agreements with mining enterprises.

Figure 11.3: Air emissions forecast/ high-growth scenario



Source: IEA, Energy Policies of Slovenia, 1996 Survey. Paris. 1996.

Figure 11.3.bis: Air emissions forecast/ low-growth scenario



Source: IEA, Energy Policies of Slovenia, 1996 Survey. Paris. 1996.

Table 11.7: Abatement devices of the main power stations, 1996

Unit	Capacity [MW]	Flue ash	Implementation	SO_2	NOx
TPP Šoštanj units 1-3	122	electrostatic precipitator	units will be shut down		
TPP Šoštanj unit 4	253	electrostatic precipitator	FGD and primary de-NO_x applied	wet calcite	primary
TPP Šoštanj unit 5	294	electrostatic precipitator	FGD and primary de-NO_x are planned	wet calcite	none
TETO Ljubljana units 1,2	48	filter bag	Fuel switch to low sulphur coal	none	none
Ljubljana unit 3	45	electrostatic precipitator	Fuel switch to low sulphur coal	none	none
TPP Trbovlje unit 3	105	electrostatic precipitator	unit will be shut down	none	none
TPP Trbovlje unit 4	not yet defined		new unit with abatement techn.		

Source: IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

Implementation of abatement technology and fuel switch

The new environmental legislation acts as the driving force for the implementation of abatement technology, together with fuel switches and the closure of units operating with obsolete technology. Concretely, the following main measures are considered:

- Installing emission control equipment on retrofitted units 4 and 5 in the Šoštanj power plant.
- Replacing domestic coal by imported coal with a lower sulphur and ash content. This measure essentially concerns CHP and HP units.
- Enforcing the relevant provisions of the Protocol on Further Reduction of Sulphur Emissions and EU Council Directive 93/12 EEC for oil products.
- Replacing the Trbovlje power plant by a new unit equipped with abatement technology.
- Closing down old units 1,2,3 at the Šoštanj thermal power plant.

The planned abatement technology for Slovenia's main power plants is summarized in table 11.7.

Energy prices

Prices of energy products and energy taxes are important instruments in any energy conservation policy. In this respect, the current situation in Slovenia is as follows:

Oil and refinery products. Import prices for crude oil are not regulated. The new law on import duties, in line with the General Agreement on Tariffs and Trade (GATT/WTO), entered into force in 1996. The Government set ceiling prices on the main forms of energy for final consumption (petrol, fuel oils and LPG). The end-use prices of other products are not regulated, but consumption is very low. The purchase prices are the result of negotiations between the Government and production and distribution companies. The sales taxes on liquid fuels are clearly lower than in EU, as is seen from table 11.8. A new carbon or CO_2 tax on liquid fuels has recently been introduced (see chapter 4).

Table 11.8: Average sales tax rate for liquid fuels in % of pre-tax price

Fuels	EU	Slovenia
Leaded petrol	254.8	134.0
Unleaded petrol	222.5	108.1
Diesel	170.5	117.7

Source: IEA, Energy Policies of Slovenia. 1996 Survey. Paris, 1996.

Natural gas. Import prices are negotiated between GEOPLIN (the gas company co-owned by the Government) and suppliers and transporters. There are no import duties on gas. At distribution, the Government sets maximum (or guideline) prices, which are the same for all GEOPLIN customers. On the whole, gas prices in Slovenia are lower than average prices in western Europe.

Table 11.9: End-user prices of energy

Fuel	Units	Sector	Price US$/unit	Tax US$/unit	Total US$/unit	Low Heat Value GJ/unit	Price US$/GJ
Heavy fuel oil	tonnes	**Industry**	179.6	52.1	231.7	41.00	5.65
		PP & CHP	181.2	53.7	234.9	41.00	5.73
Light fuel oil	thousand litres	**Industry**	281.0	44.3	325.3	34.86	9.33
		Household	281.2	44.5	325.7	34.86	9.34
		PP & CHP	280.9	44.1	325.0	34.86	9.32
Brown coal	tonnes	**Industry**	44.2	0.0	44.2	12.00	3.68
		Household	129.1	21.5	150.6	12.00	12.55
		PP & CHP	65.7	0.0	65.7	12.00	5.48
Natural gas	thousand Nm^3	**Industry**	183.0	9.0	192.0	34.08	5.63
		Household	293.0	14.0	307.0	34.08	9.01
Electricity	MWh	**Industry**	67.0	6.0	73.0	3.60	20.28
		Household	107.0	100	117.0	3.60	32.50

Source: Ministry of Economic Affairs of the Republic of Slovenia.

Coal. The lignite price for the Šoštanj thermal power plant is determined annually, and the maximum price is set by the Government in line with the price of imported coal. The present lignite price from the Šoštanj mine covers all production costs. The direct budget subsidies granted to other coal mines (sub-bituminous coal) will end with their closure.

End-user prices of energy. The present policy tries to keep energy prices as low as possible to keep inflation in check (table 11.9). Changes introduced in present pricing policy are still relatively small. However, prices differ according to the user, with lower prices for industry. The change of ownership of exploration activities will have an impact on the concession granted. Also, a new system of electricity production and consumption pricing is being studied. The price of electricity and district heat should cover the investment, operation and maintenance costs of the new abatement technology facilities. It should also be in accordance with the relevant environmental regulations, foreseeing the implementation of abatement technology by the year 2004.

Independent generation of electricity by auto-producers (small hydropower plants, combined cycles in industry, institutions and residential areas) is, in the opinion of experts involved in the energy saving policy programme, still too low. The economic viability of small power plants depends to some extent on the ratio of fuel cost to sales price. Thus, the type of fuel used and the overall efficiency of the process (in terms of specific fuel consumption per MW of electricity produced) are important. Considering the 1996 fuel and electricity price relationship, co-generation seems to be the most cost-efficient, particularly as the use of natural gas in co-generation does not give rise to new abatement technology or other environmental costs (e.g. ash handling). However, the conversion of the existing heating stations to conventional PP and CHP can hardly be competitive with the use of electricity from the national grid (table 11.10).

11.4 Conclusions and recommendations

Conclusions

The energy economy of Slovenia entered the transition process at an unfavourable moment. The situation has been further aggravated by cash shortages, limiting the scope for rapid improvements at all relevant levels.

Despite this situation, the Government incorporated and pursued environmental objectives in its energy policy. Energy conservation measures and the reduction of air polluting emissions from energy production units received priority. The successful and effective development of the legal and institutional framework for the implementation of adequate policy measures at the national level during the early phase of transition might explain not only the successes, but also the formulation of convincing objectives and strategies to be realized during the coming decade. At the same time, the implementation of energy conservation targets and related environmental aims at the regional level is done on a voluntary basis only and remains problematic.

Regarding energy conservation measures, the current energy intensity and use patterns might explain the comparatively cautious approach to efficiency measures. Regarding the industrial sector, the measures taken rely primarily on educational and promotional programmes, and the results of energy

Table 11.10: Share of fuel cost in the industrial electricity price by generation technology, 1996 prices

Technology	Fuel	Price US$/GJ	Heat rate GJ/MWh	Fuel cost US$/MWh	Electricity US$/MWh	Share of fuel cost in industrial electricity price
SC/PP	Brown coal	5.48	10.5	57.49	73.0	78.75%
SC/CHP	Brown coal	5.48	7.5	41.06	73.0	56.25%
SC/PP	Heavy fuel oil	5.73	10.5	60.17	73.0	82.42%
SC/CHP	Heavy fuel oil	5.73	7.5	42.98	73.0	58.87%
CC/CHP	Natural Gas	5.63	5.6	31.55	73.0	43.22%

Source: Compilation, based on information from the Ministry of Economic Affairs.
SC/PP unit with conventional steam cycle, producing electricity only.
SC/CHP unit with steam cycle with co-generation of heat and electricity.
CC/CHP unit with combined cycle with co-generation of heat and electricity.

audits, although first attempts have been made with financial instruments like tax allowances for using energy-saving appliances in households. Liberalization and privatization should have a positive effect on energy efficiency. In accordance with IEA estimates, up-to-date technologies, combined cycle co-generation units, variable speed drivers on large pumps and fan motors and oxygen trimming in industrial boilers are all technical tools able to reduce the specific energy demand by about 25%. On the whole, however, it might be advantageous to step up the development of economic conservation measures in the industrial sectors, if possible in close contact with the emerging business sector.

Likewise, conservation measures might need to become more specific for both the transport and the residential sectors. Energy consumption by transport has already shown the strongest increase during the transition period so far, and is likely to increase further with the expansion of transit traffic. It would therefore be important to coordinate environmental, energy and transport policies in such a way that a coherent conservation policy emerges (see also chapter 12).

According to the 'Study of Energy Conservation Strategy in Slovenia', the potential for energy saving in the residential sector is between 30 and 50%, depending on the type, age and technical characteristics of buildings. Technical improvements focus on insulation, heating systems, electrical appliances and the like. The thermal standards of the Building Code need to be harmonized with those of the EU. Attention should now focus on public buildings, where measures similar to those of the residential sector should be applied. On the whole, substantial improvements can be expected only in the long term, especially given the current lack of funds.

The future evolution of energy prices will be a strategic variable in the success of energy conservation measures. It may be that the existing margin for increases in the level of taxation - including the carbon or CO_2 tax on liquid fuels - has not been fully exhausted. Also, it may become wider if economic recovery proceeds in such a way that social problems linked to strong increases in energy prices need not be feared. It is possible that the organization of a public debate on the issue could help clarify the situation. In principle, energy prices comparable to European levels will, in the medium term, be unavoidable. It should be noted that energy prices will soon increase due to the introduction of value-added tax (VAT).

Independent generation of electricity could possibly be increased, if the surplus production fed into the national distribution network were remunerated at levels approaching supply prices from the grid. To the extent that decentralization of electricity generation accelerates the introduction of new and cleaner technology, extended auto-generation would be consistent with the declared aims of the energy policy. In a more specific context, it can be expected that the future competitiveness of district heating will largely depend on energy pricing, particularly when new abatement technology will have to be installed at heating stations. Introducing district heating by biomass burning in suitable small towns/villages would help cut SO_2 and CO_2 emissions in settlements.

The achieved reduction in emissions of SO_2 from point sources constitutes a considerable success. The switch from high-sulphur domestic coal to gas oil, gas or low-sulphur imported coal is a very efficient measure. It can be expected that the country's SO_2 emission levels will be comparable to those of the EU by the year 2004.

The measures foreseen to reduce NOx emissions should be sufficient to comply with the requirements of the respective regulations, which are comparable to the EU standards. Nevertheless, as transport increases, NOx emissions cannot be cut any further without secondary measures which are costly. The strategy for reducing NOx emissions focused on the transport sector (see chapter 12).

Reaching EU levels in terms of CO_2 emissions will be more problematic. The requirement under the United Nations Framework Convention on Climate Change is to stabilize CO_2 emissions at their 1990 level. This will be difficult to achieve, once GDP starts picking up. The main obstacle to reducing CO_2 emissions is the transport sector.

Emissions of solid particulate matter can be cut through measures in the household sector. The ongoing fuel switch programme for residential areas represents the best policy option. The problem of using ashes and $CaSO_4$ from the flue-gas desulphurization process is solved at the Šoštanj power plant through the landscape restoration

programme at the Velenje Lake and the local coalmine. However, a systematic economic study of the potential demand for such wastes (ash and $CaSO_4$) in construction or the production of construction materials is advisable. In particular, the problem of managing solid wastes should be integrated as soon as possible in the decision-making process (which was not yet completed at the time of writing) leading to the selection of units for the new power plant in Trbovlje. Wet scrubber abatement technology is suitable for abating SOx, but generates solid $CaSO_4$. A possibly low demand for $CaSO_4$ could tip the balance in favour of the installation of fluidized bed combustion, which could represent a less capital-intensive option.

Nuclear energy produces more than 20% of the national energy requirements, and safety is of great concern to the public. The Energy Strategy is planning for the closure of the Krško NPP by the year 2023. The plant is subjected to the safety controls regularly applied in EU countries. After 2023, the policy on this issue will be in agreement with that of the EU countries, including with regard to radioactive waste storage and final disposal. The option of continuing nuclear electricity generation could be strengthened by objectives related to climate change policies, e.g. attempting to decrease CO_2 emissions.

Recommendations

Recommendation 11.1:

Extend the development of the energy conservation programme to transport, with particular attention to the objectives of reducing NOx and CO_2 emissions.

Recommendation 11.2:

The climate change issue should be fully included in the next revision of the energy, the energy conservation and the environmental policy programmes. The future roles of hydropower and other renewable forms of energy ought to be addressed in that context.

Recommendation 11.3:

Revise the thermal standards that are currently prescribed in the Building Code in order to bring them into line with best available technologies. The thus modified standards should to the extent possible be respected in programmes for retrofitting buildings with energy-saving structural improvements. *(See also Recommendation 3.6)*

Chapter 12

ENVIRONMENTAL CONCERNS IN TRANSPORT

12.1 Transport infrastructure, activities and environmental effects

Slovenia is situated at one of Europe's main cross-roads. Due to its geographical position, two arteries have historically crossed Slovenia. The West-East route is the shortest from Northern Italy to the Pannonian Lowlands and the North-South route connects the Alps with the Balkan Peninsula. Transit traffic of goods and passengers causes environmental problems. These are likely to increase as the current impediments to transit traffic disappear.

Furthermore, as international tourism grows, so does traffic. Domestic urban traffic is already a burden on the local air quality.

To meet the increased transport demand, new infrastructure is currently being planned and developed. Strategies regarding other aspects of transport policy are also being discussed. A major challenge is to pay attention to environmental concerns in the transport planning processes.

Developments in transport

The amount of transport in Slovenia has increased substantially during the last 10 - 15 years. At the same time the modal split has changed from public to private transport and from rail to road, for domestic, international, as well as transit traffic. In particular the number of short distance car trips (from three to ten kilometres) has increased, at the expense of public transport and cycling.

Car ownership has long been relatively high in Slovenia, as opposed to other central and eastern European countries. Between 1985 and 1994, car ownership grew from 254 to 330 cars per 1 000 inhabitants, and is now close to the west European average. Data on the vehicle fleet are shown in table 12.1. In 1985, 52 per cent of all households in Slovenia owned a car, in 1993, 68 per cent did. Since 1991, sales of new cars have shifted to larger engines. A reduction in the occupancy rate of private cars has been observed as motorization has grown.

Between 1992 and 1994, oil consumption for road transport rose 35 per cent, compared with a 30 per cent increase between 1985 and 1992. The increase is partly due to cross-border sales to Austrian and Italian motorists because fuel in Slovenia is cheaper (see chapter 11).

Much of the traffic in Slovenia is transit traffic. The only rail connection between Greece and the rest of EU runs through Slovenia, as does the southern rail and road link between west and east Europe. Maritime transport handles shipping trade for Austria, Hungary, Slovakia and the Czech Republic, which places extra pressure on the transport network. In 1994 about 66 million cars and 2 million trucks crossed the borders, half of them were in transit. Tables 12.2 and 12.3 give an overview of the passenger and freight transport market in Slovenia in 1993. Depending on the possible actions taken to reverse the trend, traffic growth is expected to accelerate and the change in modal split towards road traffic will continue. For the purpose of developing a transport masterplan, different scenario forecasts have been presented.

Table 12.1: Vehicle fleet, 1992-1996

	1992	1993	1994	1995	1996
Number of vehicles (thousands)	746	793	762	813	851
Number of vehicles /th. inhabitants	373	396	381	406	425
Average age (passenger cars)	n.a	8.9	8.1	7.3	6.5
Estimated turnover rate (%)	4.7	8.3	7.0	8.6	8.0

Source: Ministry of Environment and Physical Planning, 1997.

Table 12.2: Performance of passenger transport, 1993 [passenger kilometres]*

	Passenger transport 1993		
	Total	**Public transport**	**Private transport**
National			
Thousand passenger kilometres per day	25 664	6 610	19 054
Modal split	100%	26%	74%
Share in total passenger kms per day	70%	74%	69%
International			
Thousand passenger kilometres per day	9 347	2 121	7 226
Modal split	100%	23%	77%
Share in total passenger kms per day	26%	24%	26%
Transit			
Thousand passenger kilometres per day	1 575	201	1 374
Modal split	100%	13%	87%
Share in total passenger kms per day	4%	2%	5%
Total			
Thousand passenger kilometres per day	36 586	8 932	27 654
Modal split	100%	24%	76%
Share in total passenger kms per day	100%	100%	100%

* Intrazonal traffic is excluded.

Source: Road and Rail Transport Demand and Traffic Forecasts for Slovenia, PROGNOS, revised final draft, Cologne, November 1996.

Table 12.3 Performance of freight transport, 1993 [tonne kilometres]

	Freight transport 1993		
	Total	**Road**	**Rail**
National			
Thousand tonne kilometres per day	4 745.8	4 271.8	474.0
Modal split	100%	90%	10%
Share in total goods moved	33%	51%	8%
International			
Thousand tonne kilometres per day	3 177.5	1 547.4	1 630.1
Modal split	100%	49%	51%
Share in total goods moved	22%	18%	26%
Transit			
Thousand tonne kilometres per day	6 634.0	2 569.5	4 064.5
Modal split	100%	39%	61%
Share in total goods moved	46%	31%	66%
Total			
Thousand tonne kilometres per day	14 557.3	8 388.7	6 168.6
Modal split	100%	58%	42%
Share in total goods moved	100%	100%	100%

Source: Road and Rail Transport Demand and Traffic Forecasts for Slovenia, PROGNOS, revised final draft, Cologne, November 1996.

"Trend scenario" forecasts, based on the official schedule for implementing the different adopted infrastructure projects, suggest an overall increase in passenger transport demand from 1993 to 2015, both in volume and in performance. Depending on economic development, the highest growth rates, of approximately 2 per cent per year, will occur up to 1998. After that, the annual growth rate will decline to nearly 1 per cent per year in 2015. Regarding the different transport segments, the highest growth is expected in transit transport. Due to higher motorization, the private transport sector is expected to grow by 63 per cent in volume, while public transport shrinks by 20 per cent in this period. This development will, if it occurs, increase the modal share in volume and performance of private transport from about 72 per cent in 1993 to 84 per cent in 2015.

The total demand for freight transport is expected to increase by nearly 156 per cent in volume from 1993 to 2015. As with passenger transport, the highest growth rates, of about 4.7 per cent per year, will occur in the first period from 1993 to 1998 and will

reach an annual rate of 4.1 per cent in 2015. Freight transport by road will increase at an above-average rate. The higher growth rate of road transport changes the modal share of road freight transport from 77 per cent in 1993 to 84 per cent in 2015 in terms of volume and from 58 to 70 per cent in terms of performance. The growth rates of transit traffic are slightly lower than the average freight transport growth rates in the "trend scenario".

The road and railway networks are relatively dense. The total road network in 1993 covered 14,733 km, of which 198 km are motorways, 1,356 km are major roads, 3,393 km are regional roads and 9,786 km local roads (roads in urban areas excluded). Seventy-six per cent of these roads are paved. The rail network covers 1,201 km, of which 499 km are electrified. The present road network is not considered to have sufficient quality nor capacity to meet future demand. Although there is surplus capacity in the railway system, the services are of poor quality.

Both for urban and for inter-city transport, there has been a modal shift from bus services to individual transport.

Maritime transport is centred in the Slovene port of Koper. Thirty per cent of Austria's overseas trade passes through Koper. The port is relatively modern, especially with regard to the capacity of integral transport, container and ro-ro terminal. The share of transit in maritime transport is rising. Thus, goods turnover in Koper increased by 15 per cent in 1994 and there are plans to enlarge its port facilities.

Slovenia has three international airports, in Ljubljana, Maribor and Portoro (intended for tourism).

In 1993, the Slovene transport and communications sector represented 7 per cent of GDP and employed about 36,300 persons.

Environmental effects of transport activities

Transport is a major contributor to climate change, accounting for over 30 per cent of Slovenia's CO_2 emissions in 1995, and more than 90 per cent of CO emissions. Transport is also a large contributor to acidification, accounting for approximately 70 per cent of NO_x emissions in 1995 (see chapter 4, table 4.1). In 1994, the transport sector accounted for 35 per cent of final energy consumption, compared to an average of 32 per cent in OECD-Europe.

Traffic is a major cause of local air pollution, noise and odour. Increased traffic and congestion make road traffic even the principal source of local air pollution. In general, air pollution caused by NO_x is most severe in the direct vicinity of busy roads and it is increasing. Acoustic quality has also deteriorated owing to increased road traffic and the age structure of the road vehicle fleet.

The present categorized road system covers 9,120 hectares of land (chapter 3), of which 5,130 ha of roads strictly speaking, representing 0.25 per cent of the total land surface, of which motorways account for 0.03 per cent. The motorways increased from 90 kilometres in 1981 to 198 in 1993. With the new programme of construction, motorways will cover an additional 0.1 per cent of the total land surface. The construction of 315 kilometres of highway will demand about 1,500 hectares of agricultural land, of which 79 per cent on the plains is classified as prime agricultural land.

The building of transport infrastructure might degrade the natural environment, like wetlands, forests and habitat, agricultural land and landscape. Fragmentation of natural areas is seen as a threat to Slovenia's unique biological diversity (see chapter 7).

As traffic increases and new infrastructure is built, the amount of waste generated from transport activities will grow. Intensive motorway construction will lead to more waste from the building industry. Furthermore, the numbers of scrapped cars, old car batteries and old tyres will rise sharply.

Some aspects of traffic accidents are dealt with in chapter 13.

12.2 Policy and management regarding environmental effects of transport

Legal requirements for environment-related transport policy and management

The Environmental Protection Act provides for important regulations and other measures to ensure that environmental concerns are considered in transport planning and traffic management. Thus, the EPA is the legal basis for ambient air quality standards, noise standards, rehabilitation/sanitation programmes, the application of the polluter-pays-principle by introducing polluter charges and environmental impact assessments. The health-related ambient air quality criteria, based on existing WHO Guidelines, are particularly relevant to transport.

Infrastructure projects are subject to environmental impact assessment (EIA), including an EIA at strategic level first, and then an impact assessment of the existing situation, an assessment of ambient concentrations after construction, and proposals for measures to reduce the effects of traffic on the surrounding areas. During the planning stage, a comparative study is prepared for each highway. Environmental impact is compared, as are technical and financial issues. The main comparison criteria are those for regional and urban development, traffic effectiveness and other technical, environmental and economic criteria, and social acceptability.

There is a developed legislative basis for spatial planning and for its integration of environmental issues (see chapter 3). The corresponding regulations are also relevant for the planning of transport infrastructure. The particularly important Law on Spatial Planning establishes the responsibility of spatial planning for the protection and rational use of natural resources, the development of different spatial activities, and for land-use coordination.

The Law on Management of Settlements and Other Spatial Interventions defines the development, reconstruction and extension of settlements, the infrastructure in urban areas and the development of the countryside.

The EPA also defines the role of spatial planning. According to the EPA, environmental vulnerability studies should be a basis for decisions on transport infrastructure. Furthermore, the EPA makes general provisions concerning noise immission planning standards, and noise emission standards for roads and railways. At present, new regulations are being developed to ensure better coordination between the environmental protection instruments and the planning legislation.

Municipalities have long-term and medium-term communal plans. They comprise criteria to achieve spatial and environmental goals, guidance for the development of settlements and guidelines for the protection of the environment's natural and cultural values.

On the basis of its Association Agreement with the European Union, Slovenia is committed to adapting its legal systems to the EU system in order to ensure coordinated development and gradual liberalization in the field of transport between the EU and Slovenia. The harmonization of emission standards for vehicles and relevant taxes and economic incentives are particularly important to the environment.

Furthermore, in 1993 Slovenia signed a transport agreement with the European Union. It was concluded for a period of ten years and can automatically be extended for one year at a time. The aim of the agreement is to promote cooperation between Slovenia and the EU on transport, in particular, transit traffic, and so to ensure that transport between and through the territories of the parties is developed in a coordinated manner. The scope of the agreement covers transport infrastructure, market access in the field of road transport, essential legal and administrative support measures like taxation and technical measures, and cooperation in developing a transport system which meets environmental needs.

Slovenia is also a party to the International Convention for the Protection of the Alps, under which a transport protocol is being prepared. Negotiations on this protocol have not yet been finalized. According to the draft of February 1996, the protocol aims to reduce the impact of transport in the Alpine region to a level that does not harm people, animals or vegetation.

Policy objectives

In the former Yugoslavia, strategic decisions on transport were made by the federal government. Now policy objectives regarding the integration of environmental concerns in transport planning will be defined in the transport masterplan, which the Slovene Parliament is due to adopt in 1997. A first draft was presented by the Ministry of Transport and Communications in June 1996.

Two supporting documents, the strategic environmental assessment of the transport masterplan (final draft report) and the road and rail transport demand and traffic forecasts for Slovenia (revised final draft) were presented in September 1995 and November 1996, respectively. These two documents have been produced with financial support from the PHARE programme. Once adopted, the masterplan will be implemented with the help of a transport action programme.

The draft transport masterplan puts forward objectives for transport systems, economic and social aspects, environment and traffic safety. For transport systems it suggests:

- Providing a minimal level of mobility
- Cutting transit traffic and preventing unnecessary traffic
- Diverting passenger (rail and bus) and freight (rail and combined transport) traffic to public transport.

The plan suggests the following economic and social goals:

- Preserving social security for the employees in the transport sector
- Promoting EU guidelines on the harmonization of terms of competition and free access to the infrastructure, and adapting the quality and service of the national transport infrastructure step by step to those of the EU
- Linking urban and rural areas with sustainable transport modes, including integrating 'demographically' endangered areas as well as specific and socially endangered groups.

Several goals are suggested with regard to the environment:

- Using land rationally and preserving the characteristic features of landscapes and biodiversity
- Curbing air pollution
- Solving the problems involved in the recycling of scrapped cars
- Ensuring the safe transport of hazardous goods
- Reducing noise emissions from road and rail transport
- Reducing the harmful impact of air transport on the environment
- Preventing pollution from maritime transport
- Changing the modal split
- Raising public awareness about the environmental impact of transport.

According to the transport agreement with the European Union, Slovenia will, as soon as possible, develop the following main road and rail routes:

1. The south-west/north-east motorway which runs from the Italian border to Šentilj at the Austrian border via Ljubljana and Maribor, and to Lendava at the Hungarian border via Ptuj.
2. The north-west/south-east railway line which runs from Jesenice at the Austrian border to Dobova at the Slovene-Croatian border with a branch to Se ana at the Italian border.
3. This railway line will be modernized so that it is suitable for the introduction of combined transport technology.
4. The railway line from Ljubljana to Maribor.
5. The north-west/south-east motorway which runs from the Karawanken tunnel at the Austrian border to Bregana at the Slovene-Croatian border. The motorway from Maribor to Ptuj (the south-west/north-east motorway) and Macelj at the Slovene-Croatian border.

The agreement foresees further that the Slovenian railways be modernized. The combined transport system needs to be adapted, with particular regard to the development or building of terminals, to tunnel gauge and to capacity. Both parties are obliged to take all supporting steps necessary to encourage the development of combined transport.

Implementing institutions and measures

Responsibilities for transport policies and management are divided between different ministries and administrative levels. While the Ministry of Transport and Communications is the responsible authority for road and railway infrastructure and traffic, the Ministry for Technology and Science is responsible for vehicle standards, the Ministry of Internal Affairs for traffic management, and the Ministry of Finance is implementing tax policy. Local public transport is the responsibility of the municipalities. The MoEPP is responsible for the spatial planning of regional and national transport infrastructure. Other transport infrastructure projects are planned by the municipalities on the basis of national plans. The MoEPP is also responsible for monitoring emissions from the transport sector.

Slovenia has introduced several measures to reduce the environmental burden from transport and to ensure the integration of environmental concerns in its future transport policy. New measures and instruments are being prepared. For the time being, no rehabilitation programmes have been implemented covering the transport sector, nor has a comprehensive programme to apply the polluter pays principle.

Infrastructure and transport planning. Planning of transport infrastructure follows the procedures laid down in the laws on spatial planning and the planning of regional and national projects is carried out by the MoEPP. The development of infrastructure shall, according to the EPA, be subject to environmental impact assessment at strategic level too. Although

strategic decisions have in the past frequently been made without a strategic environmental impact assessment, relevant regulations have since been adopted. The projects which have been undertaken without strategic EIA will now be subject to an environmental impact assessment at corridor level. By studying different alternatives, possible environmental conflicts may be avoided or minimized. The EIA process is followed by monitoring during construction, and during the road's first two years of operation to test the efficiency of mitigation measures.

Future infrastructure projects and other transport policy plans will be subject to a strategic environmental impact assessment. Thus, both the Government's forthcoming transport masterplan and possible plans for the development of a high-speed rail link have been subject to strategic environmental impact assessments.

Among the measures suggested in the transport masterplan are price and tax incentives like parking fees, fuel taxes, differentiated vehicle taxes and toll charges implementing the polluter pays principle, and regulatory measures like vehicle and fuel standards, parking regulations, traffic management, investment policies, public transport services and land-use planning.

In an annex to the transport agreement with the European Union, Slovenia explains that, to complete the construction of the infrastructure mentioned in the agreement, an estimated sum of US$ 4 billion (i.e. Slt 541 billion) would have to be available. Slovenia intends to put up 50 per cent of this sum and expects the remainder to be provided by international financial institutions, private investors and the European Union. Financial support has already been obtained in the form of loans from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). The main national sources for financing motorway investments are toll charges from existing sections of motorway and revenues from the "petrol tolar", an earmarked fuel tax of 16 per cent of the retail price of fuels.

The first priority among the road projects listed in the agreement with the EU is the east-west/north-east motorway. Investment cost for this project are estimated at a total of US$ 3.0 billion (i.e. Slt 406 billion).

Resources for financing the national railway infrastructure programme are estimated at US$ 1.6 billion (i.e. Slt 216 billion), of which, according to the Parliament's decision, 37% will be financed during 1994-99 and 63% during 2000-2005. For the period 1994-97, 38% of the total investments are expected to be financed by EIB and EBRD.

Demand management. The trend towards urban sprawl and a more car-dependent land-use development calls for the active integration of land-use and transport planning, so as to reduce the need for transport and provide for effective public transport. Regulations/guidelines for such integrated planning are being prepared and are expected to be adopted in the near future. These guidelines are expected to initiate stronger cooperation in spatial planning between the MoEPP and the municipalities.

Being one of Europe's important transit countries, Slovenia is paying much attention to the resulting transport burden. A basic strategy in this regard is that all the costs originating from transport should be borne by it. Price regulation and the low fuel tax are part of the national policy to control inflation. As the inflation rate now seems to approach an acceptable level, the Government is considering increasing the fuel taxes, and has recently introduced a CO_2 tax (chapter 4).

The draft transport masterplan suggests introducing economic instruments like parking fees and increased road toll charges for freight transport.

Modal split. Public transport is losing market share as private car use increases. As in other countries, there are several reasons for this modal split change: higher income levels, growing car ownership, urban sprawl and outdated public transport systems that suffer from a lack of resources and are not able to meet present travel demand patterns.

Public transport services (except railways) are managed under the exclusive responsibility of the municipalities. There is no regional level responsible for this mode of transport, unless the municipalities themselves take the initiative to cooperate. A trend towards splitting municipalities into smaller units is increasing the institutional barriers to providing effective public transport.

The national Government has not presented a plan for improving local public transport services. However, public transport concerns are raised in the draft transport masterplan and several measures are suggested. The draft transport masterplan also puts forward a national bicycle and pedestrian traffic programme.

Vehicle and fuel standards. Slovenia has adopted or intends to adopt relevant EU standards. In 1994, emission standards were issued requiring catalytic converters for new vehicles, either sold in or imported into Slovenia. The import of used cars older than three years is prohibited. Thus, the EU directives 70/220/EEC and 88/77/EEC on emissions from vehicles and their daughter directives (among others 91/542 and 94/12/EEC) have been implemented.

The EU directive 92/97/EEC on noise emissions from vehicles has also been implemented. Regulations to limit noise emission from subsonic aircraft are under preparation. Annual car taxes are contingent upon engine size. There are no other tax incentives like a differentiated purchase or annual tax to promote the introduction of less polluting vehicles.

An implementing ordinance for the EPA contains fuel and petrol requirements and regulates the import, production and supply of transport fuels. In 1995, a decree on the quality of fuels as regards sulphur, lead and benzene concentrations was issued, based on EU directives. In October 1995, the diesel sulphur content standard for road vehicles was lowered to 0.2 per cent. In the future, all fuels will have to meet quality requirements corresponding to the standards set by the European Community in 1993, limiting the sulphur content of diesel fuel to 0.05 per cent by the year 2000. This is expected to reduce air pollution considerably (see chapter 4). Since 1996, the maximum lead content has corresponded to the EU standard of 0.15 g/l. A complete phase out of leaded petrol is planned for the year 1998. Alternative fuels are being tested by the Ljubljana public transport company.

12.3 Conclusions and recommendations

Conclusions

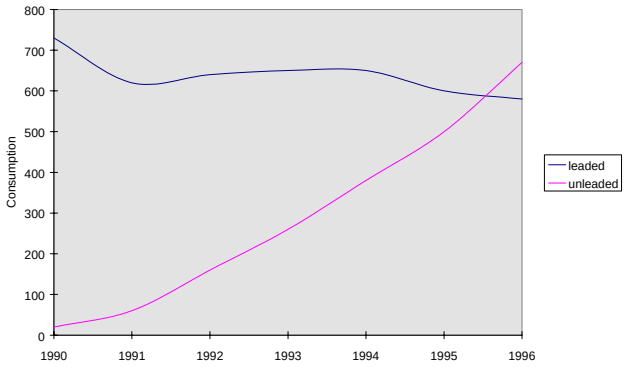
All the basic legislation necessary for an effective transport policy and management that protect the environment from the effects of transport activities is in place. The planning of transport infrastructure projects follows the procedures laid down in the Law on Spatial Planning and the Law on Management of Settlements and Other Spatial Interventions. Both the laws on planning and the EPA provide a legal basis for adopting regulations and guidelines regarding the environmental impact of transport infrastructure, noise immission standards, air quality standards and the protection of the environment's natural and cultural values. These regulations, guidelines and recommendations have to a considerable extent been enacted and seem to provide effective instruments for minimizing the environmental impact in the planning of individual projects. Furthermore, each infrastructure project is subject to an environmental impact assessment, as required by the EPA.

Decisions on essential motorway projects have been made without a strategic environmental impact assessment, partly because they were taken before concrete regulations were issued. Although certainly facilitating negotiations related to EU accession, this could result in underestimating their adverse impact on nature. If possible, the national programmes for the construction of highways and railway infrastructure should be reviewed so as to integrate environmental requirements.

Present plans for developing new transport infrastructure might lead to new environmental conflicts unless sufficient attention is paid to their environmental impact. This seems to be the case particularly for certain intersections of the south west/north east motorway. It is hoped that the Slovene national environmental policy requirements will play a decisive role in the formulation of these plans.

The car fleet has become cleaner as the import of cars without a catalytic converter is prohibited. Fuel quality is improving in terms of the content of polluting substances. Over the period 1990-1996, total petrol use increased by 66%, with consumption of unleaded petrol progressing from 5% to 54%. However, the consumption of leaded petrol has only declined moderately in absolute terms (figure 12.1). Slovenia's Association Agreement with the European Union calls for harmonization in emission standards for vehicles. Consequently, polluting emissions from individual vehicles will continue to fall. On the other hand, energy use for transport per capita has risen due to the overall growth in traffic, the change in modal split and the larger engine sizes. Land used for transport infrastructure is also increasing.

Figure 12.1: Consumption of leaded and unleaded petrol 1990-1996 [in 1000m^3]



Source: MoEPP.

As a strategic measure to provide for further European integration, Slovenia has signed a transport agreement with the European Union, thereby committing itself to developing appropriate transport infrastructure for transit traffic, covering road, railway and combined transport. The agreement includes essential legal and administrative policy instruments like taxation and technical measures, and cooperation in developing a transport system which meets environmental needs.

On the basis of the infrastructure investment plans adopted by Parliament, the Government is now preparing a transport masterplan suggesting the adoption of a transport policy for the future aimed at offering adequate access while simultaneously minimizing the environmental impact of transport. The transport masterplan has been subject to a strategic environmental impact assessment. The draft plan suggests a comprehensive transport policy to curb traffic growth, to change the modal split in an environmentally sound way and to reduce the environmental impact from individual vehicles. The plan presents a comprehensive package of measures. To reduce the environmental burden, it is of great importance that this forthcoming transport action plan should also suggest a comprehensive policy, combining measures to curb private car use and measures to provide for alternative transport solutions.

The integration of Slovenia in the EU is likely to increase transit traffic more than in the "trend scenario". On the other hand, the introduction of different measures and instruments could limit the expected traffic growth for the different transport market segments and the modal split could be influenced significantly in favour of railways and public transport to reverse the current trend.

Important decisions have been made by Parliament on investments in the transport sector. The decisions indicate that a relatively large part of the resources during the first part of the period covered by the transport agreement with the EU will be allocated to the road sector. Consequently, the modal share of road transport might increase more than is acceptable from an environmental point of view. If this risk materializes, it will run against Slovenia's other objectives regarding the modal split.

Public transport is losing market share for several reasons, such as higher income levels, growing car ownership, urban sprawl and public transport's difficulties in meeting present travel demand patterns. This trend is likely to intensify, unless counteractions are taken. A possible future change towards public transport and soft modes like walking and cycling calls for the comprehensive transport policy to contain a package of instruments to curb car traffic and strengthen and modernize public transport. As many private car trips are relatively short, there is a potential for switching from car to bicycle.

Urban sprawl may lead to an increase in demand for transport and impede the development of effective public transport services. This trend calls for the integration of land-use and transport planning and the development of policy instruments for such integrated planning. Consequently, it is of great importance to complete the guidelines for the integration of land-use and transport planning, so as to reduce the need for transport, make effective public transport and soft modes possible, and reduce the environmental impact of transport.

Local public transport is the responsibility of the municipalities. The trend to split municipalities into smaller units and the lack of a regional body to coordinate public transport planning and operating seem to be institutional barriers to developing more effective public transport services. While respecting the current allocation of responsibilities to local administrations, the national Government nevertheless needs to ensure an effective distribution of public resources spent on different transport sectors. Thus, it should consider developing a policy plan for local public transport, and discussing measures needed to develop this mode of transport in areas where it has a potential for providing effective and environmentally sound transport. The development of public transport schemes involving several municipalities in a region should receive particular attention in the policy plan. The national plan should in particular ensure that the largest urban

areas are served effectively by public transport systems.

Some environmental taxes have been introduced in the transport sector, like a CO_2 tax on liquid fuels and a higher tax on leaded petrol. The income from the CO_2 tax is expected to amount to Slt 7.1 million in 1997. The tax on unleaded petrol is nearly 5 per cent lower than the tax on leaded petrol. The potential for internalizing the external costs of transport by introducing economic instruments should be further explored, as fuel taxation may be considered a strategic variable in this connection. Present fuel taxes are substantially lower than in neighbouring countries (see chapter 11).

As mentioned above, there are some deficiencies in the institutional arrangements between the national and the local levels. In addition, cooperation and contact between the MoEPP and the Ministry of Transport and Communications is today more or less limited to what is formally required on the basis of assigned mandates. Strengthening the daily contact between the ministries could help to ensure that environmental concerns are integrated into transport sector planning at an early stage.

Recommendations

Recommendation 12.1:
Existing transport policy programmes should be reviewed systematically to specify measures to cope successfully with future increases in traffic volume. The programmes for urban transport policies should be able to benefit from information obtained from improved monitoring. *(See also Recommendation 4.1)*

Recommendation 12.2
A national policy plan for local, regional and long-distance public transport should be established, including a policy for a regionally balanced development of local public transport systems.

Recommendation 12.3:

The work on guidelines for the integration of land-use and transport planning should be completed as a matter of urgency.

Recommendation 12.4:

The envisaged transport action plan should contain a comprehensive package of measures and instruments to curb private car use. Public transport, alternative transport modes, and the introduction of cleaner vehicles and fuels should be promoted. In particular, effective policies should reduce - or avoid an increase in - environmental pressure from traffic in large urban areas.

Recommendation 12.5:

Available financial means should be used to a greater extent to the benefit of relatively more environmentally friendly modes of transport.

Recommendation 12.6:

An increase in taxes together with other economic instruments such as road pricing schemes and the further grading of vehicle and fuel taxes in relation to their relative environmental impact should be introduced as quickly as possible.

Chapter 13
HUMAN HEALTH AND THE ENVIRONMENT

13.1 Health status and environmental conditions

The assessment of the health impact of environmental factors or of activities affecting the environment should be based on data on such an impact or on the population's exposure to the hazardous factors. Both these types of data are scarce in most societies for (at least) two reasons. One is the non-specific nature of most of the health effects of environmental exposure, as non-environmental factors are also involved in their aetiology. The other is the feasibility of collecting appropriate exposure data. Routine monitoring of the quality of the environmental media and of the health status of the population is usually not sufficient to assess the impact and gives only an approximate indication of the possible exposures and impact. Present levels of exposure in most developed societies, such as Slovenia, are low due to the lessons learnt from past experience and the adoption of protective measures. This further complicates the assessment, as little is known about the health effects of low-level exposure.

General health status

The health status of Slovenia's population has generally improved in the last decade. Over the period 1980-1995, life expectancy at birth has increased by 2.9 years for men (to 70.3 years) and by 2.6 years for women (to 77.8 years). The average rate of increase in life expectancy is similar to that observed in the European Union and higher than the average in central and eastern Europe. Life expectancy at birth is still more than two years shorter than in EU countries, but exceeds the central and east European average by more than 3 years.

Infant mortality has decreased steadily in the last decades and has reached the level observed in EU countries. In the 1990s, post-neonatal mortality, possibly the indicator that best reflects the impact of sanitary conditions on the environment of the children, reached the EU level. The percentage of neonates with a birth weight over 2500 g in Slovenia exceeds the EU level.

Among the causes of death, the most common in 1995 were diseases of the cardiovascular system (42.4% of all deaths) and malignant neoplasms (24.5%). Mortality resulting from diseases of the cardiovascular system is declining in Slovenia, in contrast to the average for central and eastern Europe, but the (age-standardized) mortality rates still exceed the European average (by 14%), and the level in EU (by 40%). Relatively closer to the central and east European than to the EU rates is cancer mortality. The year-to-year variation in the rates is large (possibly due to the population's size and the random variation in the number of deaths), but the increase (by 20% from 1989 to 1994) of age-standardized rates of cancer deaths in females below 65 years of age may be of concern if there is no return to the previous level within the next few years. Half of this increase is due to cancers of the trachea, bronchus and lung, the types of cancers which are determined, to a large extent, by smoking habits. However, no specific data on changes in smoking habits which could explain the increase in the mortality rates are available. Another plausible hypothesis, which might be worth exploring, is related to the increase in indoor exposure to radon, e.g. due to poorer ventilation in buildings and to young women spending more time indoors.

Close to 10% of all deaths result from injuries and poisoning, caused mainly by motor vehicle accidents and suicides. Mortality due to those causes in Slovenia is among the highest in Europe. The death rates due to motor vehicle accidents draw particular attention. They were almost 20% higher in 1994 than in 1990-91 (and twice the European average). Close

to 500 deaths were caused by such accidents in 1994. According to Slovene estimates, half the fatal accidents are caused by violations of traffic laws, including speeding. Another quarter is caused by alcohol abuse. The technical conditions of roads or vehicles have not been indicated as a common cause of accidents.

Information on diseases related to the environmental or sanitary conditions in the country is scarce. The incidence of hepatitis has dropped below the mean of EU countries in recent years, from the mean European level observed in the 1980s. The number of recorded outbreaks of water-borne diseases has decreased in the past five years, but the number of cases recorded in 1995 was markedly higher than in 1993 and 1994 due to one large outbreak in the Celije region (table 13.1). Out of all the recorded cases, only a few were hospitalized. The pathogens blamed for some of the outbreaks were *Shigella sonnei, Entamoeba histolytica, Lamblia intestinalis,* rotavirus, adenovirus and *Escherichia coli*. No specific micro-organism was detected in the remaining 18 outbreaks.

Table 13.1: Outbreaks of water-borne disease recorded in Slovenia, 1990-1995

Year	No. of outbreaks	Total no. of cases	Maximum no. of cases in one outbreak
1990	2	212	176
1991	6	1109	482
1992	6	1114	540
1993	7	338	166
1994	2	33	23
1995	2	467	428

Source: Institute of Public Health of the Republic of Slovenia.

Air pollution and environmental health

Sulphur dioxide (SO_2) and black smoke. The results of SO_2 and black smoke monitoring are available for more than 50 cities in Slovenia, inhabited by a total of more than 500,000 people (i.e. close to 25% of the total population). In 1994, only in two locations (Zavodnje and Zagorje), with some 8 000 residents, did the annual mean SO_2 concentration exceed the annual limit value of 50 $\mu g/m^3$. The 24-hour limit value was exceeded for 1 to 39 days during 1994 in 21 cities, but the exceedance for more than 10 days in 1994 affected only seven towns, with some 80,000 residents. Maximum daily concentration reached rather high levels in Zavodnje and in Šoštanj (respectively, 801 and 602 $\mu g/m^3$) but these episodes were exceptional, and in all other towns the maximum daily concentrations were below 300 $\mu g/m^3$. In comparison with 1993, the number of days with SO_2 concentration exceeding the daily limit value decreased in several cities but there were more days with exceptionally high levels (>critical value) of pollution in 1994 than in 1993.

The sources of SO_2 in Slovenia also emit suspended particulates. Annual mean black smoke levels were below 40 $\mu g/m^3$ in all locations in 1994, while this level was exceeded in some cities in 1993. 24-hour mean black smoke levels rarely reached the limit value of 125 $\mu g/m^3$ (1-5 days in six cities), and the maximum recorded value was 211 $\mu g/m^3$. This is a marked improvement on the situation in 1993.

On the basis of epidemiological studies conducted in various countries in Europe and North America, one can expect that the present levels of SO_2 and particulate pollution in Slovenia will adversely affect health. Suspended particulates and SO_2 in air exacerbate respiratory diseases, which therefore require hospitalization, and increase the risk of death due to cardio-respiratory diseases. However, with the expected increase in the risk of adverse health effects not exceeding a few percent at the present pollution levels, and in view of the relatively small size of the exposed population, the estimated number of individuals who will actually suffer from the effects of pollution should be small (not more than 10 cases annually). It is uncertain, however, to what extent the present measurements of particulate pollution, using black smoke as an indicator, also reflect the exposure of the Slovene population to respirable particles (as PM10 or PM2.5). If the concentrations of PM10 are comparable with the black smoke levels reported by Slovene monitoring, up to a few hundred people per year may suffer from coughing or lower respiratory problems, and may need medication or medical care due to exposure to suspended particulates.

Nitrogen dioxide (NO_2). Data on NO_2 are available for six locations. Based on this limited evidence, NO_2 pollution does not seem to be a significant problem in Slovenia. The highest 1-hour concentrations exceeded the limit value of 200 $\mu g/m^3$ (the new Air Quality Guideline (AQG) level) for a few hours in 1994 (maximum concentrations reached 230 $\mu g/m^3$).

These maximum concentrations were measured at a high-impact monitor, on a street, close to the traffic in the centre of Maribor. Acute health effects of such levels of NO_2 are unlikely. The annual mean levels of NO_2 ranged from 40 to 50 $\mu g/m^3$ in most monitoring locations. These long-term levels are not likely to affect health either (revised WHO AQG is 40 $\mu g/m^3$). However, such levels of traffic-related NO_2 indicate a possibility of high levels of respirable particles, also emitted by traffic, which may affect health. Furthermore, the NO_2 determines ozone formation in the troposphere and may indirectly affect health, as explained below.

Ozone (O_3). Ozone is monitored in five locations in Slovenia. Similar concentrations were observed in urban areas (in Ljubljana and Zavodnje), in rural areas, and in a location at high altitude, in the summers of both 1993 and 1994. The observed peak ozone concentrations may affect the health of the vulnerable part of the population. Risk of respiratory problems in children and in exercising adults may rise 20-30% on the days with the highest ozone concentrations. One can also expect a 10-20% increase in hospital admission rates due to respiratory conditions.

Between June and August 1993, when the ozone level exceeded the 8-hour limit value of 100 $\mu g/m^3$ for 37 days in Ljubljana, some 4 - 7% of all hospital admissions for respiratory conditions were probably related to this pollution. Based on the average hospitalization rates for Ljubljana residents, this may correspond to some 50-90 additional hospital admissions in the summer of 1993. It is difficult to quantify the impact on the entire Slovene population, because the data on ozone concentrations are limited. However, since the available results from other monitoring locations are not much lower than those obtained in Ljubljana, and since rural concentrations of ozone may be higher than those close to sources of NO_2 scavenging ozone, the proportion of hospitalizations attributable to the pollution should have been similar throughout Slovenia. This would correspond to some 240-460 additional admissions due to ozone pollution countrywide in June-August 1993.

Other air pollutants. The information on other ambient air pollutants that can affect health is very scarce. Heavy metals (lead and cadmium) were reported by two local monitoring networks only (Maribor and Celje). In Maribor, the measured concentration of lead in 1994 was about 0.3 $\mu g/m^3$, which was half the 1992-93 level and well below the WHO AQG (0.5 $\mu g/m^3$). In Celje, the results from part of 1994 indicate even lower concentrations (0.2 $\mu g/m^3$). Volatile organic compounds (VOCs) and polycyclic organic compounds (benzo-a-pirene) were also measured only in Maribor. Seasonal variations indicate that emissions come from residential heating and coal combustion. Since some of the polycyclic aromatic hydrocarbons and VOCs are recognized as cancinogens, their presence in the air potentially contributes to the risk of lung cancer in the exposed populations. However, the scarcity of exposure data and uncertainties in risk estimates of these mixes of pollutants prevent an assessment of their impact on cancer risk in Slovenia. Moreover, much of the population's exposure to these pollutants results from indoor air pollution sources, such as cooking or heating appliances, and from environmental tobacco smoke. Comprehensive risk control should include indoor environments, as well as outdoor sources.

Drinking water and environmental health

Drinking-water supply. According to the survey conducted by the Institute of Public Health of the Republic of Slovenia in 1995, 77% of the population is supplied by one of the 968 public water-supply systems, ranging in size from those serving at least 20 people or 5 households to the largest, serving over 280,000 people. Groundwater is provided to more than 57% of the users, and karstic water to 38%. Only 5% of users of piped water obtain water from other springs and surface sources. The water supply is assessed as "insufficient" in 168 water-supply systems serving 6.2% of users (i.e. ca. 103,000 people). More than one third of the people with insufficient water supply use one large system in Kranj; the other systems with insufficient supply are located in various regions of the country.

Water supplied to 29% of people using piped water undergoes "conditioning", which includes "any actions taken to prepare a water source, other than chlorination, as opposed to direct distribution of the water from the source by the network". Disinfection is prescribed for the water piped to 46% of water users. Another 1% of users is supplied with water chlorinated occasionally, depending on the weather and the quality of source water.

Drinking-water quality. In 1995, the Institutes of Public Health tested close to 30,000 drinking-water samples for microbiological contamination and more than 13,000 samples for physico-chemical properties. The existing standards were not met in 12% of the microbiological tests and in 9% of the physico-chemical tests. Of the latter, 40% of samples were deemed unsatisfactory because their nitrate levels exceeded the standard value. The level of total nitrogen exceeded the standard value in systems supplying water to more than 140,000 people. Most of the other unsatisfactory samples failed to comply with the standard due to their turbidity or colour.

Most of the chemical tests use basic methods. A more complex analysis is carried out on fewer samples (e.g. levels of selected pesticides were assessed in some 60 samples in 1995). A survey carried out in 1995 on levels of arsenic, lead and trihalomethanes in water showed that, in most cases, the levels of the selected pollutants did not exceed the maximum permitted concentrations. The occasional analyses carried out by the regional Institutes of Public Health have indicated that a large number of carcinogenic substances are present in drinking water. Even though individual parameters do not exceed the standard concentrations, the cumulative effect of all these substances on health may be of concern.

It is not possible to use these monitoring results to estimate the exposure of the population to drinking water of insufficient quality, since they are often used directly to correct the water treatment procedures or to apply other measures decreasing the risk of an adverse health impact. Yet, in spite of the intensive monitoring, outbreaks of water-borne diseases caused by microbiological pollution are reported, as illustrated in table 13.1. The number of individuals affected by microbiological pollution of drinking water from small or individual supply systems, which are often not well maintained and not sufficiently covered by monitoring, may exceed the number of cases reported in the outbreaks. One can speculate that, if 10% of such systems are contaminated once a year (compared to 12% of regularly controlled systems), some 2-3% of the population (40 to 60,000) may annually suffer from gastrointestinal problems as a result of microbiological contamination of drinking water.

Waste and environmental health

There is considerable public concern about the impact of waste on health. The impact by direct contact is limited. It may occur in an occupational setting, among those involved in the collection, transport, disposal and treatment of waste. For the general population, the main health hazard is the disposal of waste in water and the leaching of hazardous substances from insufficiently sealed landfills into ground and surface water. Since groundwater is the main source of drinking water in Slovenia, and since a large part of this water is not treated before consumption, improper waste management does constitute a health risk. Inadequately treated waste creates a hazard to health, ranging from microbiological hazards associated with uncollected or uncovered disposal of municipal solid wastes, to toxic hazards from uncontrolled hazardous waste disposal and contaminated industrial areas.

Domestic waste is deposited in 54 landfills; in 1992 these had already been filled to 60% of their capacity. They did not meet international standards and were a potential threat to the environment. Besides these landfills, there are 50,000 to 60,000 illegal disposal sites, of which 2000-3000 dumps with a capacity of more than 100 m^3 (chapter 6). In 1994, only 53% of domestic waste water was to some degree treated before final discharge.

Assessing the health risk related to waste requires a complex exposure assessment. This is rarely feasible in most societies. The monitoring programme for drinking water and food should provide the basis for assessing the exposure to the most common chemicals. In the existing water monitoring programme, a possible source of contamination is sought whenever a specific chemical is detected in drinking water. This is not always the case for microbiological contamination, especially in karstic areas, because the catchment basin of karstic waters is so large. A regular food monitoring programme (following the Global Environmental Monitoring System (GEMS)/Food methodology) will be undertaken by the Institute of Public Health in 1997. In the beginning, it will focus on pesticides, though the laboratories can detect and quantify all relevant chemicals (including congener-specific analysis of polychlorinated piphenyls (PCBs) and dioxins (PCDDs)).

Present monitoring of food does not indicate an increased level of the hazardous chemicals in most of the tested samples. An exception is the elevated Pb level in food samples from the highly polluted zone around the lead mine and manufacturing centre in Me ica. The zone, populated by a few thousand people, is classified as unsuitable for agriculture, but small quantities of vegetables and fruit are grown in gardens and consumed by the residents.

Another exception and a source of concern is the contamination of the river Krupa by a large quantity of PCB which occurred in 1983. High PCB levels were detected in the river's water and in various foodstuffs from Bela Krajina in 1987-88 as well as in 1989-91. PCB levels in 80 blood samples collected from Bela Krajina residents in 1991-92 ranged from 0.2 to 5 ng/ml. Such levels are at the low end of the concentrations observed in the general population in most studies and well below concentrations associated with dermatological effects in occupationally exposed individuals (80-100 ng/ml).

Radon and environmental health

Radon is a known human carcinogen. Epidemiological studies indicate a lung cancer unit risk of approximately 3 - 6 $*10^{-5}$ per Bq/m^3 of lifetime residential exposure. This means that a person living in an average European house with 50 Bq/m^3 has a lifetime excess lung cancer risk of 1.5-3 $*10^{-3}$.

Several areas in Slovenia, mainly in the central and south-western part of the country, appear to have above average natural radiation levels, and part of the population is exposed to higher levels of radon in air and in water. The calculation of indoor radon concentrations started in 1986 with measurements in houses and flats. Since 1990, radon concentrations and gamma dose rates have been measured systematically in kindergartens and play schools, as part of a nationwide programme. The results of this study indicated that in the majority (72%) of buildings the concentration was below 100 Bq/m^3, while in 2% the radon concentration exceeded 800 Bq/m^3, with two kindergartens reaching 2,000 Bq/m^3. For them remedial action was taken. Caves popular with tourists were investigated with respect to radon-222. In all of them the concentrations exceeded that of outdoor air, reaching levels of 6,000 Bq/m^3 (Tabor Cave).

Though the present data do not provide a sufficient basis for estimating the residential exposure of the entire population, the measurements conducted in schools indicate that in Slovenia relatively many houses have a high radon concentration. Therefore, 9-17% (i.e. 80 - 150 cases per year) of all lung cancers can probably be attributed to this exposure.

13.2 Instruments of environmental health policy and management

Legal instruments and objectives

The Constitution of the Republic of Slovenia, in its Article 72, stipulates that "Each person shall have the right to a healthy environment in which to live, in accordance with the statutes. The State shall be responsible for ensuring such an environment. ..." This basic law is supported by the Environmental Protection Act (Article 1), which ultimately aims to protect "human health, well being and the quality of life."

The Environmental Protection Act stipulates that the State's responsibilities include:

- Monitoring the health-related ecological conditions (Ministry of Health in cooperation with MoEPP), Art. 69 (2) 3;
- Operating the information system including databases on health-related ecological conditions, Art. 73 (2) 11;
- Preparing national environmental reports (Art. 75) which will include data on ecological influences on the population's health (Art. 76 (1) 2).

The Ministry of Health intends to propose to the Parliament that it should ratify the documents adopted by the European Conferences of Ministers in 1989 and in 1994 ("European Chapter on Environment and Health" and the "Helsinki Declaration") as the broad basis for the country's environmental health policy. Furthermore, the forthcoming national health plan up to the year 2000 will specify environmental health targets among other issues. The proposed wording of the targets is, however, rather general and further acts will be needed to provide a legal basis for environmental health management.

The Institute of Public Health in Ljubljana is preparing the national environmental health action plan. All the problems should have been identified by December 1996, and the plan should be ready by mid-1997. The Institute keeps in contact with MoEPP to ensure that the national environmental health action plan and the NEAP are compatible.

National standard values for air quality. The present national standards of air quality are based on the WHO Air Quality Guidelines of 1987. The latest update of the regulations on air quality protection was issued in 1994 with the "Ordinance on limit, alarm, and critical values of compounds in the air". The Slovene Decree lays down two levels of air pollution concentration, limit values and critical values. According to the Decree, the limit value is "that particular concentration of a noxious substance in the ambient air which neither affects the health of human beings, nor influences their well-being, and has no adverse effects on vegetation" . The critical concentration is defined as twice the limit value. In principle, the limit value for all the substances regulated by the 1994 Decree was set at, or below, the WHO Air Quality Guideline level, to prevent any adverse effect, where relevant.

The by-laws referred to in the Decree and adopted by individual regional administrative units specify the types of actions to be taken in pollution episodes, when the critical value of a pollutant is exceeded. The actions range from public warning to reducing emissions from the main sources.

National drinking-water quality standards. The National Drinking-Water Quality Standards originate from the former Yugoslavia and differ from the WHO Water Quality Guidelines of 1993 in terms of the water quality indicators and the value of the parameters. The Institute of Public Health is working on a proposal for new national standards taking into account the WHO Guidelines and the EU Water Directive.

Institutional arrangements and measures

According to the basic law on the division of duties between the ministries, the responsibilities of the Ministry of Health include communicable disease prevention, food and drinking-water hygiene (chemical, microbiological and radiation factors). The Ministry of Health is also responsible for ecological conditions of direct relevance to human health: drinking and recreational water, air, noise, vibration, waste treatment, ionizing and non-ionizing radiation. The Health Inspectorate has a mandate to supervise compliance of the conditions with the existing law. However, the Directive on waste waters issued in July 1996 states that monitoring waste-water pollution is the duty of the Inspectorate for Environment, except for the assessment of microbiological pollution and emissions from hospitals and other sources of potential infection.

Monitoring drinking-water quality is the responsibility of the Health Inspectorate and of the regional Institutes of Public Health. If they detect contamination, these agencies may, for instance, recommend that water use should be restricted and request (additional) water treatment. If standards for chemical contamination (e.g. with nitrates) are exceeded, water from clean sources is used to dilute the concentration of the hazardous chemical and reduce the population's exposure. According to the present law, the Health Inspectorate has no administrative powers to recommend actions to prevent water sources from being contaminated (e.g. catchment basin protection).

The frequency of inspections of public supply systems depends on the size of the systems, with the large systems (supplying more than 10,000 people each) being monitored daily. There are 30 large systems in Slovenia providing water to 56% of the population.

The water quality in small systems is tested less frequently. There are 806 small water systems (<1,000 users each), supplying 7% of the population. The regional Institutes of Public Health take fewer than 100 water samples per year from such systems. At the same time, the quality of drinking water from the small systems can be, potentially, worse than in larger systems, due to poorer maintenance (most small systems lack trained personnel) and less control of water protection zones.

The quality of the water consumed by the 18% of the population who are not served by the public water-supply system is not systematically monitored. The quality of this water is unclear. However, in the past, wells were sited and constructed under the supervision and with the advice of the regional Institutes of Public Health. Therefore, water from most individual sources should be protected adequately from direct contamination. Yet, as

groundwater is frequently polluted, it is possible that many people consume water that fails to meet quality criteria.

The provision of healthy living conditions also concerns the Council for Environmental Protection, funded by the Parliament.

13.3 Conclusions and recommendations

Conclusions

Environmental quality data indicate that the adverse impact of pollution on health in Slovenia is no worse than that observed in many other countries in Europe. Most trends in health status are satisfactory. For many health indicators, the values are reaching EU levels.

The general legal framework and public opinion see public health as a priority objective of environmental protection. Slovenia's legal system and its institutional infrastructure related to environmental protection are being modified so that they will be better able to control and reduce environmental pollution. The links with public health agencies and specialists should be improved to optimize the environmental protection activities in terms of public health.

There is not enough support for the general policy objectives in the more detailed implementing ordinances on environmental health. The more detailed articles of the EPA concentrate on the protection of the natural environment. This may lead to public health not being considered, for instance, in environmental impact assessment procedures or in the promotion of environmental research. The present legislation's lack of detail might lead to confusion, undermine the assessment of the health risk related to environmental factors, and weaken the ability to effectively protect the population's health from the adverse effects of environmental pollution. At present, the working relationships between the Health Inspectorate and the Inspectorate for Environment are good. However, clearer directives defining the exact responsibilities of the various sectors and agencies are necessary.

The present capacities of environmental health agencies (mainly the Institutes of Public Health) should be effectively used in assessing risk and supporting risk management. They should involve the public health sector and experts in developing the national standards, monitor the population's exposure to environmental health hazards, contribute to environmental (health) impact assessments and to the annual national environmental reports. Environmental health expertise should be developed by facilitating training, exchanging information and researching the most relevant environmental health issues in Slovenia.

Air pollution may cause several hundred extra cases of lower respiratory tract illness and hospitalization due to respiratory diseases per year. Particulate pollution and ozone are the most common causes of the symptoms, with SO_2 at present concentrations being less likely to cause health problems. The air quality standards will need to be reviewed again when the new, revised WHO Guidelines are published.

An important, and potentially growing, air pollution problem is traffic emissions, especially the summer episodes of photochemical pollution. It is possible that suspended particulates cause a considerable number of health problems, but the limited exposure data do not allow for a more precise assessment.

Mortality due to injuries, poisoning, and above all traffic accidents, is exceptionally high and displays unsatisfactory trends. More effective accident prevention and treatment of accident victims are needed to reduce the impact of traffic on health.

In spite of the large water resources, the water supply through public systems is insufficient for 5% of the population, i.e. ca. 100,000 people. The bulk (2/3) of the shortages occur in one system, in Kranj. The regulation on the granting of concessions for the economic exploitation of water sources approved by the Government in October 1995 allows municipal authorities and other local communities to seek additional water sources. This should improve the water supply where necessary.

The quality of drinking water from non-public sources, used by 18% of the population, is not monitored at all. Another 7% of the population drinks water from small systems, which are very rarely monitored. Since these systems are not maintained or protected professionally, their water may pose a health risk to a large part of the population. Microbiological pollution of these sources is a primary health concern. A rough extrapolation of the

present data indicates that more than 50,000 cases of (mostly unreported) gastrointestinal disease per year might be linked to microbiological water pollution.

The outbreaks of water-borne disease remain the most direct health effect of environmental contamination. Though the number of outbreaks tends to decrease, the number of people taken ill in individual outbreaks remains high. The relatively most pronounced, though certainly underreported, are the problems related to (microbiological) pollution of drinking water and the increasing pollution of groundwaters by insufficiently controlled or treated domestic and industrial wastes.

Inappropriate waste management does pose a health hazard, due both to the population's potential exposure to pathogenic micro-organisms and to toxic chemicals in drinking water and food. The most likely exposure route is through groundwater contamination. Besides strict prevention and control of the discharge of hazardous waste into the environmental media, and groundwater in particular, current plans to expand the monitoring of the population's exposure to contaminants in drinking water and food should be enough to keep the risk to health from insufficiently controlled hazardous substances within acceptable limits. The available data on the contents of hazardous chemicals in food are limited but do not indicate a high risk of food contamination for the general population.

A more precise exposure assessment, using measurements of lead levels in blood, should be performed to estimate the risk to health, particularly in children, and where a potential for increased exposure exists - such as in the Me ica region. This should support any decision concerning a potential need for exposure reduction.

Specific for Slovenia is the relatively high level of the population's exposure to radon. Though the radon levels are not related to human activities, the population's exposure can be modified by better building construction and ventilation. The systematic monitoring of radon levels in schools and homes should be continued, and followed up with remedial actions where guideline levels are exceeded.

The increasing cancer mortality in females below 65 years of age calls for a closer analysis and identification of its causes. Smoking habits and/or exposure to radon should be considered among the possible causes of the increase, assuming that a possible impact of procedures for the registration and classification of the cause of death can be ruled out.

Recommendations

Recommendation 13.1:

The national environmental health action plan should be used for harmonizing environmental health activities and for defining them more clearly.

Recommendation 13.2:

National plans relevant to the promotion of environmental health programmes should include provisions for developing the capacities for assessing and reducing environmental health risk.

Recommendation 13.3:

Trends in NO_2 concentrations should be systematically evaluated, in order to assess the effects of increasing traffic on human health. *(See also Recommendation 4.1)*

Recommendation 13.4:

The present monitoring of respirable particles (PM10 and PM2.5) should be expanded to assess the health risk better. *(See also Recommendation 4.1)*

Recommendation 13.5:

The prevention of traffic accidents and the treatment of accident victims should receive highest priority.

Recommendation 13.6:

A special survey should supplement the regular water quality monitoring to assess the conditions of individual water-supply systems and to estimate potential health risks.

Recommendation 13.7:

The control of the quality of drinking water in supply systems that are either not, or insufficiently, monitored should be intensified as soon as possible.

Recommendation 13.8:

To improve unsatisfactory supply systems, investments in the water-supply system of Kranj should be given priority.

Recommendation 13.9:

A special assessment of the exposure of the population (especially children) to lead should be carried out in the region of Mezica to determine whether accumulated waste has caused health risks or health damage.

Recommendation 13.10:

Preventive measures should be taken to secure the foundations of new houses in radon-prone areas against radon inflow and accumulation so as to reduce the population's exposure. *(See also Recommendation 3.4)*

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ANNEXES

I. Selected Environmental Data

II. International Agreements on Environment

III. Chronology of Selected Environmental Events

Annex I

SELECTED BASIC DATA

Selected Environmental Indicators[1]	SLOVENIA	AUSTRIA	CZECH REP.	ESTONIA	HUNGARY	ITALY	NETHER LANDS	POLAND
LAND								
Total area (1 000 km^2)[2]	**20**	84	79	45	93	301	37	313
Major protected areas (% of total area)[3]	**8**	23.9	13.5	7.8	6.2	7.6	10.2	9.8
Nitrogenous fertilizer use (t/km^2 arable land)	**14.5**	8.3	6.2	2.7	3.1	7.7	38.8	5.2
FOREST								
Forest area (% of land area)	**53**	46.9	34.0	47.6	19.1	23.0	10.3	28.9
Use of forest resources (harvest/growth)	**0.4**	0.6	0.6	0.9	0.5	..	0.5	0.5
Tropical wood imports (US$/cap.)[4]	**1.0**	1.5	..	..	..	7.6	18.4	..
THREATENED SPECIES								
Mammals (% of species known)	**62**	37.5	29.9	26.2	69.9	32.2	44.8	6.5
Birds (% of species known)	**55**	28.1	28.2	13.0	94.2	30.9	32.6	7.5
Fish (% of species known)	**40**	42.5	23.9	2.8	34.6	28.6	43.5	2.6
WATER								
Water withdrawal (% of gross annual availability)	**28**	2.8	15.8	18.0	5.7	32.1	8.6	19.5
Fish catches (% of world catches)	**0.005**	-	-	0.1	-	0.5	0.5	0.4
Public waste water treatment (% of population served)	**53**	72	56	85	32	61	97	42
AIR								
Emissions of sulphur oxides (kg/cap.)	**59.7**	8.9	125.2	95.6	72.6	29.6	9.4	67.6
" (kg/US$ 1000 GDP)[5]	**6.4**	0.5	14.4	13.9	..	1.8	0.6	..
Emissions of nitrogen oxides (kg/cap.)	**33.3**	22.8	36.4	26.0	18.4	36.0	34.9	28.7
" (kg/US$ 1000 GDP)[5]	**3.6**	1.3	4.2	3.8	..	2.1	2.1	..
Emissions of carbon dioxide (t/cap.)[6]	**7.1**	7.2	12.4	15.0	5.8	7.0	11.3	8.6
" (tonne/US$ 1000 GDP)[5]	**0.76**	0.40	1.49	2.19	..	0.41	0.67	..
WASTE GENERATED								
Industrial waste (kg/US$ 1000 GDP)[5,8]	**200**	41	..	42	..	34	32	..
Municipal waste (kg/cap.)	**400**	430	401	336	387	350	500	338
Nuclear waste (tonne/Mtoe of TPES)[7]		-	1.1	..	..	-	0.2	..
ROAD TRAFFIC NOISE								
Population exposed to leq > 65 dB (A) (million inh.)	**0.25**	1.2	1.5	..	..	..	0.6	..

Sources: OECD Environmental Data, Compendium 1995; UNECE EPR Estonia(1995) and EPR of Slovenia (1996).

1 Data refer to 1995 or the latest available year. They include provisional figures and secretariat estimates. Varying definitions can limit the comparability across countries.

2 Netherlands: Excluding Lake IJssel (1 708 km^2) and internal waters (Wadden Sea and North Sea: 2 473 km^3).

3 Data refer to IUCN categories I to IV.

4 Total imports of cork and wood from tropical countries.

5 GDP at 1991 prices and purchasing power parities.

6 CO_2 from energy use only; international marine bunkers are excluded. Data for Estonia refer to 1992, for Slovenia to 1995.

7 Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal.

8 Waste from manufacturing industries (ISIC 3). Data for Estonia exclude 13.5 million tonnes of ash waste from oil-shale production.

Other indicators[1]	SLOVENIA[9]	AUSTRIA	CZECH REP.	ESTONIA	HUNGARY	ITALY	NETHER LANDS	POLAND
TOTAL AREA (1 000 km^2)[2]	**20**	84	79	45	93	301	37	313
POPULATION								
Total population, 1995 (100 000 inh.)	**20**	81	103	15	101	573	155	386
% change (1980-1995)	**7.0**	6.9	0.1	3.0	-5.4	1.6	9.5	8.6
Population density, 1995 (inh./km^2)	**98.0**	96.3	130.5	33.5	108.9	190.2	415.2	123.3
GROSS DOMESTIC PRODUCT								
GDP, 1995 (billion US$)[3]	**17**	145	89	10	64	1019	266	194
% change (1980-1995)	**-4.9**	36.7	..	..	..	32.0	36.5	..
per capita, 1995 (US$ 1000/cap.)	**6.4**	18.0	8.7	6.9	6.2	17.8	17.2	5
INDUSTRY[4]								
Value added in industry (% of GDP)	**27**	34	41	24	31	32	27	32
Industrial production - % change (1980-1992)	**-21**	36	..	..	..	10	19	..
AGRICULTURE								
Value added in agriculture (% of GDP)[5]	**4**	2	6	10	6	3	3	6
ENERGY SUPPLY								
Total supply, 1993 (Mtoe)	**5**	27	40	5	24	155	70	93
% change (1980-1993)	**-23.3**	13.0	..	..	-13.6	11.1	8.2	-25.7
Energy intensity, 1993 (Toe/US$ 1000)	**0.29**	0.19	0.47	0.51	..	0.16	0.27	..
% change (1980-1993)	**..**	-15.8	..	..	..	-13.3	-18.8	..
Structure of energy supply, 1993 (%)[6]								
Solid fuels	**32.0**	23.2	57.4	67.5	20.2	8.4	13.3	76.3
Oil	**36.6**	43.2	19.4	25.8	30.1	60.3	37.2	15.2
Gas	**10.2**	22.0	14.5	6.7	34.6	26.8	48.0	8.3
Nuclear	**16.7**	-	8.4	-	-15.0	-	1.5	-
Hydro,etc.	**4.5**	11.6	0.3	-	-	4.5	-	0.2
ROAD TRANSPORT[7]								
Road traffic volumes, 1993-billion veh.-km	**5**	52	..	..	27	442	98	113
- % change (1980-1993)	**61.9**	46.3	..	..	41.4	95.0	40.0	153.4
- per capita (1 000 veh.-km/cap.)	**2.7**	6.5	..	..	2.6	7.7	6.4	2.9
Road vehicle stock, 1993, 10 000 vehicles	**68**	377	319	40	246	3258	650	858
- % change (1980-1993)[8]	**65.9**	54.6	64.9	157.1	108.9	70.4	34.5	179.9
- per capita (veh./100 inh.)	**35**	47	31	27	24	57	42	22

Sources: OECD Environmental Data, Compendium 1995; UNECE EPR Estonia(1995) and EPR of Slovenia (1996).

1 Data refer to 1995 or the latest available year. They include provisional figures and secretariat estimates. Varying definitions can limit the comparability across countries.
2 Netherlands: Excluding Lake IJssel (1 708 km^2) and internal waters (Wadden Sea and North Sea: 2,473 km^2).
3 GDP at 1991 prices and purchasing power parities.
4 Total industry: includes mining and quarrying (ISIC 2), manufacturing (ISIC 3), and gas, electricity and water (ISIC 4).
5 Agriculture, forestry, hunting, fishery, etc.
6 Breakdown excludes electricity trade.
7 Refers to motor vehicles with four or more wheels, except for Italy where it includes three-wheeled vehicles.
8 Data for Estonia refer to passenger cars only.
9 Data for Slovenia refer to 1994.

Annex II
International Agreements on Environment

	A. WORLDWIDE AGREEMENTS		
	as of January 1997		
1949	(GENEVA) Convention on Road Traffic	**y**	
1957	(BRUSSELS) International Convention on Limitation of Liability of owners to Sea Ships	**y**	
1958	(GENEVA) Convention on Fishing and conservation of Living Resources of High Seas	**y**	
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	**y**	R
1969	(BRUSSELS) Convention on Civil Liability for Oil Pollution Damages	**y**	R
	1976 (LONDON) Protocol	**y**	
1969	(BRUSSELS) Convention - Intervention on the High Seas in Case of Oil Poll. Casualties	**y**	R
1971	(RAMSAR) Convention - Wetlands of International Importance	**y**	R
	1982 (PARIS) Amendment	**y**	R
	1987 (REGINA) Amendments	**y**	
1971	(GENEVA) Convention on Protection against Hazards from Benzene(ILO 136)	**y**	R
1971	(BRUSSELS) Convention on the Establishment of International Fund for Compensation Oil Pollution Damage	**y**	R
1972	(PARIS) Convention on the Protection of the World Cultural and Natural Heritage	**y**	R
1972	(LONDON) Convention on the Prevention of Marine Poll. by Dumping of Wastes	**y**	R
1973	(WASHINGTON) Convention.- International Trade End. Species	**y**	
	1983 (GABORONE) Amendment		
1973	(LONDON) International Convention for Prevention Pollution from Ships (MARPOL)		R
	1978 (LONDON)Protocol (segregated balast)		R
	1978 (LONDON) Annex III on Hazardous Substances	**y**	R
	1978 (LONDON) Annex IV on Sewage		R
	1978 (LONDON) Annex V on Garbage	**y**	R
1974	(GENEVA) Convention on Protocol against Hazards from Carcinogenic Substances (ILO 139)	**y**	R
1977	(GENEVA) Convention on Protocol against Hazards from Air Pollution, Noise and Vibration (ILO 148)	**y**	R
1979	(BONN) Convention - Conservation Migratory Species of Wild Animals	**y**	
	1991(LONDON) Agreement Conservation of Bats in Europe	**y**	
	1992 (NEW YORK) Agreement ASCOBANS	**y**	
1982	(MONTEGO BAY) Convention on the Law of the Sea	**y**	R
1985	(VIENNA) Conv.-Protection of the Ozone Layer	**y**	R
	1987 (MONTREAL) Protocol -Substances that Deplete the Ozone Layer	**y**	R
	1990 (LONDON) Amendment to Protocol	**y**	R
	1992 (COPENHAGEN) Amendment to Protocol	**y**	
1986	(VIENNA) Convention on Early Notification of Nuclear Accidents	**y**	R
1986	(VIENNA) Convention on Assistance in the Case of Nuclear Accident	**y**	R
1989	(BASEL) Convention - Control of Transboundary Movements of Hazardous Wastes	**y**	R
1990	(LONDON) Convention on Oil Pollution Prepardness, Response and Cooperation	**y**	
1992	(RIO) Convention - Biological Diversity	**y**	R
1992	(NEW YORK) Framework Convention - Climate Change	**y**	R
1994	(VIENNA) Convention on Nuclear Safety		S

1994	(PARIS) Convention to Combat Desertification		

Source : UNECE and Slovenia.

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

Annex II (cont'd)
International Agreements on Environment

	B. REGIONAL AND SUBREGIONAL AGREEMENTS		
	as of January 1997		
1950	(PARIS) International Convention for the Protection of Birds	**y**	
1957	(GENEVA) European Agreement-International Carriage Dangerous Goods by Road (ADR)	**y**	R
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Recognition for Motor Vehicle.Equipment and Parts.	**y**	R
1968	(PARIS) European Convention - Protection of Animals during International Transport	**y**	
	1979 (STRASBOURG) Additional Protocol	**y**	
1969	(LONDON) European Convention - Protection of Archeological Heritage	**y**	R
1976	(BARCELONA) Convention - Protocol - Mediterranean Sea against Pollution	**y**	R
	1976 (BARCELONA) Protocol - Dumping	**y**	R
	1976 (BARCELONA) Protocol - Co-operation in Case of Emergency	**y**	R
	1980 (ATHENS) Protocol - Land-based Sources Pollution	**y**	R
	1982 (GENEVA) Protocol - Special Protected Areas	**y**	R
	1994 (MADRID) Protocol against pollution from exploration/exploitation		R
1979	(BERN) Convention - Conservation European Wildlife & Natural Habitats	**y**	
1979	(GENEVA) Convention - Long-range Transboundary Air Pollution	**y**	R
	1984 (GENEVA) Protocol - Financing of Co-operative Programme (EMEP)	**y**	R
	1985 (HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%	**y**	
	1988 (SOFIA) Protocol - Control of Emissions of Nitrogen Oxides	**y**	
	1991 (GENEVA) Protocol - Volatile Organic Compounds		
	1994 (OSLO) Protocol - Further Reduction of Sulphur Emissions		S
1991	(ESPOO) Convention - Environmental Impact Assessment in a Transboundary Context		
1991	(SALZBURG) Convention on the Protection of the Alps	**y**	R
	1994 Protocol on physical planning and sustainable development`		S
	1994 Protocol on Hillside Farming		S
	1994 Protocol on Nature Protection and Landscape Management		S
	1995 Protocol on Tourism		S
	1995 Protocol on Mountain Forests		S
1992	(HELSINKI) Convention - Protocol and Use of Transboundary Waters and International Lakes		
1992	(HELSINKI) Convention - Transboundary Effects of Industrial Accidents		
1992	(BUCHAREST) Convention - Protocol Black Sea Against Pollution	**y**	
1993	(LUGANO) Convention - Civil Liability for Damage from Activities Dangerous For the Environment		S
1994	(LISBON) Energy Charter Treaty		S
	1994(LISBON) Protocol on Energy Efficiency and Related Aspects		S

1994 (SOFIA) Convention on Cooperation for the Protection and Sustainable Use of the Danuble River		S

Source: UNECE and Slovenia

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

Note: The status of ratification of the above-mentioned environmental conventions by the 55 UNECE member States was updated for the Conference “Environment for Europe” in Sofia (October 1995) and published in document SOF.CONF/BD.3.

Annex III

CHRONOLOGY OF SELECTED ENVIRONMENTAL EVENTS (1991-96)

1991

June Slovenia declares its independence on 25 June 1991.

1992

March A fire at Kobariški Stol north of Breginje destroys 1800 hectares of grassland.

June Slovenia becomes a member of the United Nations and participates in the United Nations Conference on Environment and Development in Rio de Janeiro. Slovenia signs the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change.

August Up to 1.3 ug/l of PCB is found in the river Krupa**.**

September Slovenia ratifies the 1979 Geneva Convention on Long-range Transboundary Air Pollution and its EMEP Protocol.

November Slovenia ratifies the Vienna Convention for the Protection of the Ozone Layer, as well as the Montreal Protocol and the London amendments to the Montreal Protocol.

1993

January-Oct. A long-lasting drought causes 36 billion dollars worth of damage in agriculture. Fire damages 6,917 hectares of land and there are difficulties with the supply of drinking-water. Electric power generation is reduced.

January A very strong north wind severely damages the Nova Gorica, Ajdovščina and the Vipavska valley region. Traffic between Ajdovščina and the Vipavska valley region and between Ajdovščina and Razdrto is interrupted. In the Tmovski Gozd region strong winds damage 1,500 hectares of wood.

July A hail storm in north-eastern Slovenia causes much damage in the Gomja Radgona and Lenart region to orchards and vineyards, residential and industrial buildings, and roads. Electricity supply and telephone communications are interrupted.

In 1993, the following regulations are adopted:

- **The Environmental Protection Act**
- **Decree on the establishment and naming of a council for the protection of the environment**
- **Directive on temporary water usage limit from watercourses**
- **Directive on protecting threatened species**
- **Ordinance on Methodology for Drawing up an Opening Balance**
- **Act on Forests**
- **Act on Amendments of the Act on Dealing with Settlements and Other Interventions in the Environment**

1994

July A fire near Nova Gorica in western Slovenia rages for 7 days, destroying 575 hectares of pine plantations.

October An agreement between the Government of the Republic of Slovenia and the Government of the Republic of Hungary on solving water management issues is ratified.

Following a traffic accident in Obrovo 15,500 litres of oil seeps into the karstic underground. The water-supply system in Ri anski vodovod is closed down for 10 days.

December At the third Alpine conference in Chambery, Slovenia takes over the presidency of the Alps Convention. Within the framework of the Alps Convention, protocols on hillside farming, physical planning and sustainable development as well as on nature protection and landscape management are concluded.

The ecological development fund of the Republic of Slovenia, a joint-stock company, starts to operate.

In 1994, the following regulations are adopted:

- **Directive on limit, warning and critical emissions of material in the air**
- **Directive on emissions of material in the air from fixed sources of pollution, from heating appliances, from burnt and burning wastes, from aluminium production plants, from manufacturing ceramics and bricks, from obtaining cement, from making cast iron, ferrous alloys and steel, from fixed engines with internal combustion and fixed gas turbines, from hot galvanization, from paint plants, from production and treatment of wood assemblies, from obtaining lead and its alloys from secondary raw materials**
- **Ordinance on prohibiting the sale and import of vehicles without a catalytic converter**
- **Ordinance on handling infectious waste left over from healthcare**
- **Directive on the protection of wild fungi**
- **Statute of the Eco-fund**
- **Directive on concession for the commercial exploitation of spring drinking water from the springs of the creeks Nemiljščica and Prošček in Kna ke Ravne**
- **Ordinance on temporary declaration of Škocjanski Zatok as a natural monument**
- **Act on the Fund for the Decommissioning of Krško Nuclear Power Plant and Dumping its Radioactive Waste**
- **Act on Organization and Range of Work of Ministries**
- **Act on Local Government**
- **Act on Funding Local Authorities**
- **Penal Statutes of the Republic of Slovenia**
- **Reorganization of the Ministry of Environment and Physical Planning. The number of employees increases by 154% compared to December 1988. The inspectorate is also reorganized. The former water management inspection takes over responsibilities for environmental inspection as a whole and is organized as 1-stage body (before: 2-stage body)**

1995

January The Ministry of Environment and Physical Planning is reorganized. The Ministry takes over new tasks from other ministries and from local authorities and appoints new employees to this end.

February The beginning of the European Year of Nature Protection is marked with an opening ceremony in Cekinovgrad castle in Ljubljana and an exhibition on Nature Protection.

May Slovenia ratifies the Convention on the Protection of the Alps.

July An Agreement between the Government of the Republic of Slovenia and the Federal Government of the Republic of Austria on cooperation in land development, land-use planning and regional policy is ratified.

The Governments of the Republic of Slovenia and of the Republic of Hungary sign an Agreement on timely exchange of information in the event of radiological danger.

October Slovenia takes an active part in the conference “Environment for Europe” in Sofia. The session devoted to the Pan-European Strategy for the Conservation of Biological and Landscape Diversity is presided by the Slovene Minister for the Environment, Pavel Gantar.

The National Assembly of the Republic of Slovenia ratifies the United Nations Framework Convention on Climate Change.

November The National Assembly adopts a Decree on modifications and amendments of spatial components of the long-term and medium-term social plan of Slovenia, known as the "Land-use plan".

December A contract is concluded to carry out a project to reduce substances that deplete the ozone layer. For this purpose Slovenia receives irredeemable funds amounting to US$ 6.2 million.
An additional US$38 million are granted for the recovery of the irovski Vrh Uranium Mine.

29 December is proclaimed a Day of Biological Diversity by the United Nations Environment Programme. The Ministry of Environment and Physical Planning, the Natural Scientific Association of Slovenia and the Slovene Fund for Nature organize "Scientists Day" on this occasion.

In 1995, the following regulations were adopted:

- **Ordinance on the quality of liquid fuels with regard to their sulphur, lead and benzene content**
- **Directive on noise in nature and the living environment**
- **Directive on noise due to road and railway traffic**
- **Directive on taxes for water pollution**
- **Resolution on determining the price per unit of water pollution for 1995**
- **Directive on prohibiting the driving of vehicles in the countryside**
- **Directive on changes to the directive on prohibiting the driving of vehicles in the countryside**
- **Directive on concessions for the commercial exploitation of water at individual sections of 26 watercourses for the breeding of salmon-type fish**
- **Directive on concessions for the commercial exploitation of water at individual sections of 27 watercourses for electric power generation**
- **Directive on commercial exploitation of watercourses in the Republic of Slovenia for drinking water supply**
- **Act on Standardization**
- **Act on Statistics**

1996

January The Bureau of the UNECE Committee on Environmental Policy accepts Slovenia for its next Environmental Performance Review.

February The Ministers for the Environment from Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia, Switzerland and the European Community adopt and sign a protocol on mountain forests, adopt a protocol on tourism and achieve progress with regard to a protocol on transport.

A draft of the Environmental Report of 1995, which has been passed by the National Assembly, is published in the Reporter.

March Within the framework of the national programme for environmental protection, the Ministry of Environment organizes workshops to determine environmental priorities in which representatives of non-governmental organizations, science institutes and industry participate.

The Nature Protection Authority of the Republic of Slovenia in cooperation with the German Federal Office for Nature Conservation organize a meeting on environmental education.

June The representatives of three ministries participate in the Habitat II Conference in Istanbul, for which Slovenia has prepared a national programme.

Slovenia ratifies the Convention on Biological Diversity.

Two loan contracts totalling DM 35 million are concluded with the World Bank to reduce air pollution (30 million) and set up the Geographic Information Centre (5 million).
The sub-acts of the Environmental Protection Act are published to deal with substance and heat emissions when discharging waste water from different pollution sources and their monitoring.

High concentrations of sulphur dioxide and ozone are recorded in Ljubljana (the critical value of SO_2 is exceeded two and the concentration of ozone - hourly values - thirteen times).

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