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Preface

The Environmental Performance Review of Romania began with a preparatory mission in April 2000, during which the structure of the report was established. Thereafter, the review team of international experts was constituted. It included experts from Bulgaria, Denmark, France, Italy, Netherlands, Poland, Slovakia, Sweden, Switzerland, the former Yugoslav Republic of Macedonia, together with experts from the secretariat of the United Nations Economic Commission for Europe (UNECE), the United Nations Environment Programme (UNEP) and the European Centre for Environment and Health of the World Health Organization (WHO).

The review mission took place in October 2000. A first draft of the EPR report was submitted to the country for updating in March 2001. In September 2001, the draft was submitted for consideration to the EPR Expert Group of the UNECE Committee on Environmental Policy. During this meeting, the Expert Group discussed the report in detail with representatives of the Romanian Government, focusing in particular on the conclusions and recommendations. The EPR report, as amended by the Expert Group, was then submitted for peer review to the UNECE Committee on Environmental Policy at its annual session in Geneva on 25-26 September 2001. A high-level delegation from the Government of Romania participated in the peer review. The Committee adopted the recommendations as set out in this report.

The review of Romania's environmental performance is evidence of the effort that the country is devoting towards EU accession and the approximation of its legislation. This legislative process has accelerated substantially in the recent past, particularly in the area of environment. Environment-related strategies and action plans, begun before the approximation process, have been reinforced during it. However, the report also points out a number of shortcomings in implementation and enforcement, and it calls for improving cooperation among all ministries and other key partners that have competencies and responsibilities in environment management and protection.

The UNECE Committee on Environmental Policy and the UNECE review team wish Romania success in carrying out the tasks before it to meet its environmental objectives, including implementation of the recommendations contained in the present report.

UNECE would also like to express its deep appreciation to the Governments of Denmark, the Netherlands and the United Kingdom for their support, and to the United Nations Environment Programme and the World Health Organization for participating in this Environmental Performance Review.

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The preparatory mission for the project took place from 17 to 19 April 2000. The review mission was organized from 17 to 26 October 2000. An updating mission took place in Bucharest from 26 to 30 March 2001. The Peer review was held on 25-26 September 2001 in Geneva. The ECE Committee on Environmental Policy adopted the recommendations set out in this publication.

The Environmental Performance Review is a programme of the United Nations Economic Commission for Europe, Division for Environment and Human Settlements. The Team Leader is Mary Pat Silveira.

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ABBREVIATIONS, SYMBOLS AND MEASURES

APELL	Awareness and Preparedness for Emergencies at Local Level
ASRO	Institute for Standardization (Romanian)
BAT	Best available technology
BOD	Biological oxygen demand
BOT	Building operation transfer
Cd	Cadmium
CFC	Chlorofluorocarbon
CH_4	Methane
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Cl_2	Chlore
CMEA	Council for Mutual Economic Assistance
CNCAN	National Commission for Control of Nuclear Activities
CNS	National Statistical Commission
CO	Carbon monoxide
CO_2	Carbon dioxide
CP	Cleaner production
Cr	Chromium
Cs	Cesium
Cu	Copper
DDBR	Danube Delta Biosphere Reserve
DDT	Dichloro-diphenyl-trichloro ethane isomers
DEPA	Danish Environmental Protection Agency
EBRD	European Bank for Reconstruction and Development
EC	European Council
EEA	European Environment Agency
EIA	Environmental impact assessment
EIB	European Investment Bank
EMAS	Environmental Management and Audit Scheme
EPDR	Environmental Programme for the Danube River Basin
EPI	Environmental Protection Inspectorate
EU	European Union
F	Fluoride
FAO	Food and Agriculture Organization of the United Nations
Fe	Iron
GD	Government decision
GDP	Gross domestic product
GNP	Gross national product
GEF	Global Environmental Facility
GHG	Greenhouse gas
GMO	Genetically modified organism
H_2SO_4	Sulphuric acid
HCFC	Hexachlorofluorocarbon
HCH	Hexachlorocyclohexane
HCL	Chlorhydric acid
HF	Fluorhydric acid
IAEA	International Atomic Energy Agency
ICIM	National Research-Development Institute for Environmental Protection
ICPDR	International Commission on the Protection of the Danube River
INMH	Institute of Hydrology and Meteorology
IPPC	Integrated pollution prevention and control
ISO	International Standardization Organization
ISP	Institute of Public Health

ABBREVIATIONS, SYMBOLS AND MEASURES *(continued)*

ISPA	Instrument for Structural Policies for Pre-accession
IUCN	World Conservation Union
LEAP	Local Environmental Action Plan
LEHAP	Local Environmental Health Action Plan
LIFE	EU Financial Instrument for the Environment
LLLW	Low-level liquid wastes
LLSW	Low-level solid wastes
MAB	Man And Biosphere
MAC	Maximum admissible concentration
MAFF	Ministry of Agriculture, Food and Forests
MFA	Ministry of Foreign Affairs
MO	Ministerial order
MoH	Ministry of Health
MoU	Memorandum of understanding
MPP	Mass Privatization Programme
MPWTH	Ministry of Public Works, Transport and Housing
MWEP	Ministry of Waters and Environmental Protection
NAP	National Agency for Privatization
NBSAP	National Biodiversity Strategy and Action Plan
NCPC	National Cleaner Production Centre
NEAP	National Environmental Action Plan
NEHAP	National Environmental Health Action Plan
NGO	Non-governmental organization
NH_3	Ammonia
NO_x	Nitrogen oxides
NPAA	National Programme for the Adoption of the Acquis Communautaire
NSSD	National Strategy on Sustainable Development
O_3	Ozone
ODS	Ozone-depleting substance
OECD	Organisation for Economic Co-operation and Development
OG	Official Gazette
P	Phosphorus
PATN	Spatial Plan for Territorial Management
Pb	Lead
PCB/PCT	Polychlorinated biphenyl/polychlorinated triphenyl
PHARE	Programme of Assistance for Economic Restructuring in the Countries of Central and Eastern Europe
PM	Particulate matter
POF	Private Ownership Fund
POP	Persistent organic pollutant
QA/QC	Quality assurance/quality control
REC	Regional Environmental Center for Central and Eastern Europe
SAPARD	Special Accession Programme for Agriculture and Rural Development
SEA	Strategic environmental assessment
SoE	State-of-the-environment report
SOF	State Ownership Fund
SO_x	Sulphur oxides
TDS	Total dissolved solid
TEN-T	TransEuropean Network for Transport
TERM	Transport Environment Reporting Mechanism
TEN-T	TransEuropean Network for Transport
TERM	Transport Environment Reporting Mechanism
TLV	Threshold limit value

ABBREVIATIONS, SYMBOLS AND MEASURES *(continued)*

TRACECA	Transport Corridor Europe-Caucasus-Asia
TSP	Total suspended particles
U	Uranium
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UN-OCHA	Office for the Coordination of Humanitarian Affairs
USAID	United States Agency for International Development
VOC	Volatile organic compounds
WHO	World Health Organization
WWF	World Wide Fund for Nature
WWTP	Waste-water treatment plant
Zn	Zinc

Currency

Monetary unit: Leu (plural Lei)

Exchange rates: Annual average values

Year	1 US$	1 EURO (€)
1994	1,655.09	…
1995	2,033.26	2,629.51
1996	3,082.60	3,862.90
1997	7,167.94	8,090.93
1998	8,876.60	9,988.36
1999	15,333.81	16,295.26
2000	21,692.74	19,955.75

Source: National Bank of Romania (www.bnro.ro.ro).

Note: Values are period averages.

INTRODUCTION

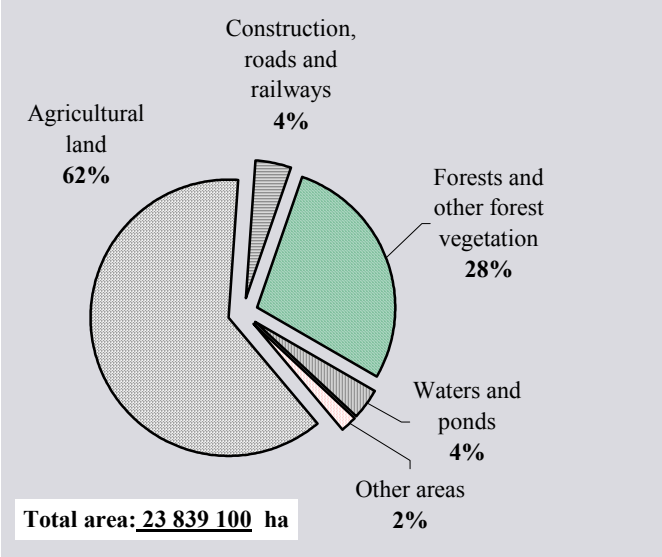
I.1 Geography

The Republic of Romania is situated in the south-eastern part of central Europe, and is crossed by the Carpathian Arch. It has a 2,903 km long border with Bulgaria, Yugoslavia, Hungary, the Republic of Moldova and Ukraine. To the east, Romania has access to the Black Sea with a coastline of 247 km. Romania covers 238,391 km^2, of which approximately 8,800 km^2 consists of bodies of water. The Carpathian Mountains cover 30% of the country's total surface area. They surround the Transylvanian Depression in the centre of the country. The remaining part of Romania is made up of hills and tablelands (37%), meadows and the fertile plains of Moldavia and Wallachia (33%). The natural vegetation in the mountains and hills consists of coniferous, beech and oak forests, alpine meadows on the Carpathian summits and steppe vegetation in the south-east.

1,075 km long, the Danube is the largest river in Romania. The Danube rises in the Black Forest in Germany and runs through 11 countries into the Black Sea in Romania. With the construction of the Danube-Black Sea and Danube-Rhine canals, it is the most important waterway to and from western Europe. The 5,800 km^2 Danube Delta contains 180,000 hectares of single reed bed, making it one of the world's largest unbroken reed bed marshes. Other important rivers, all part of the Danube system, are the Mures (766 km), the Prut (742 km), the Olt (615 km), and the Siret (571 km). Romania has many small, freshwater mountain lakes, but the largest lakes are saline lagoons on the Black Sea coast. The largest of these is Lake Razelm.

Romania has a temperate-continental climate, characterized by cold, cloudy winters with frequent snow and fog, and sunny summers with frequent showers and thunderstorms. The average annual rainfall is between 600 and 700 mm, with high rainfall (1,000-1,400 mm) in mountainous areas and low rainfall (below 400 mm) in the coastal areas. The average annual temperature is 11°C in the south, and 7°C in the north. In summertime, the *austru*, a hot south-westerly wind, blows over western Romania. In wintertime, the *crivat*, a cold north-easterly wind, blows from the East European Plain.

Figure I.2: Land cover, 1998



Source: Romanian Statistical Yearbook, 1999.

Figure I.1: Map of Romania (administrative units and main cities

Table I.1: Living standard indicators, 1994-1999

Number per 1 000 inhabitants

	1994	1995	1996	1997	1998	1999
Cars	86	93	101	110	119	126
Telephone	121	129	138	159	183 *	215 *
Internet **	…	0.750	2.212	…	6.674	…

Sources: European Union, 2000; World Telecommunication Development Report 1996/97 and 1998, 1999, ITU.

Notes:

* Fixed and mobile phone network

** Estimated Internet users

Table I.2: Main demographic indicators in urban and rural areas, 1998

	Urban	Rural
Birth rate *(per 1000)*	9.0	12.4
Fertility rate *(per 1000)*	30.1	58.8
Mortality rate *(per 1000)*	9.2	15.3
Infant mortality rate *(per 1000)*	17.3	23.3
Life expectancy at birth *(years)*	70.1	68.8
Population aged 0-15 in the total *(%)*	20.0	21.0
Population aged 65 and over in the total *(%)*	9.2	17.2

Source: National Human Development Report of Romania 1999.

The climate and relief of Romania are most favourable to agriculture and Romania's main agricultural products are maize, wheat and barley. The total agricultural area in Romania is roughly 14.8 million hectares. The agricultural area consists of arable land (9.4 million hectares), pastures and hayfields (4.9 million hectares) and vineyards, orchards and nurseries (0.5 million hectares). According to the Food and Agriculture Organization of the United Nations (FAO), the agricultural population was 7.5 million in 1980. This declined to 5.8 million in 1990 and is now estimated to be only 3.6 million, i.e. 16% of the population.

Romania's main natural resources are crude oil, timber, natural gas, (brown) coal, lignite, ferrous and non-ferrous ores, gold, silver, bauxite ore deposits and salt reserves. Most coal reserves and oil deposits are found along the mountains. The counties, or *judet*, of Bacau and Prahova are well known for their oil refineries. In 1981 oil was also discovered in the Romanian part of the Black Sea.

I.2 People and demography

Romania has 22,503,000 inhabitants and a population density of 95 inhabitants/km^2. The urban and rural population, in 1997, 55% and 45% respectively, was dispersed over 263 towns and 13,094 villages. The capital, Bucharest, is home to approximately 2 million people. The population consists of Romanians (89.5%), Hungarians (7.1%), Germans (0.5%), and others such as Roma, Ukrainians, Serbs, Croats, Russians and Turks. The official language is Romanian.

The Human Development Index (HDI) of Romania is 0.752 (on a scale of 0.0 to 1.0) and can be classified as 'median human development'. Romania ranks 68 out of 174 reviewed countries. In 1998, the adult literacy rate was 98%.

Since 1989, the total population of Romania has been declining constantly. The natural growth rate in 1998 was –1.5 per 1000 inhabitants, and both population and net migration have been declining for several years. The fertility rate dropped from 2.19 in 1989 to 1.3 in 1995/1997 and the birth rate dropped from 16.0 in 1989 to 10.5 in 1998. A higher mortality rate, which increased from 10.7 in 1989 to 12.0 in 1998, has also contributed to the decline in population. This rate is ultimately due to the deterioration in living conditions and medical services (See Chapter 14). Finally, increased emigration, as a result of the lifting of restrictions on the population's right to live abroad, has further contributed to the demographic decline.

I.3 Economy

Before 1989, Romania's economy focused on heavy and energy-intensive industry. This led to the depletion of domestic natural resources and energy shortages and, subsequently to a heavy dependence on imports of energy and raw materials. In 1997, 30% of commercial energy was imported. In addition, there were serious pollution problems, in particular in the mining and chemical sectors. Since it broke away from the planned economy of the Communist era in 1989, Romania has been in transition to a market economy. This transition is slowed down by Romania's obsolete industry, which does not suit its needs, and the stop-and-go approach to the restructuring and reform processes.

After a strong decline in the early 1990s, GDP slowly increased after 1992. In 1996 the GDP growth rate started to fall again, leading to negative growth from 1997 onwards. In 1999, GDP in current prices was US$ 34 billion (€ 32 billion). According to World Bank estimates, 22% of the population lived below the poverty line in 1998. Inflation was high at the beginning of the 1990s, but stabilized in 1995-1996. In 1997, inflation stood at 155%. A tighter monetary policy and slower exchange rate depreciation helped slow down inflation. In 1998 and 1999 inflation stood at 59% and 46%, respectively. The unemployment rate (as % of the total labour force) was 6.6% in 1996, but has since steadily increased to 11.5% in 1999 (see Table 1.3).

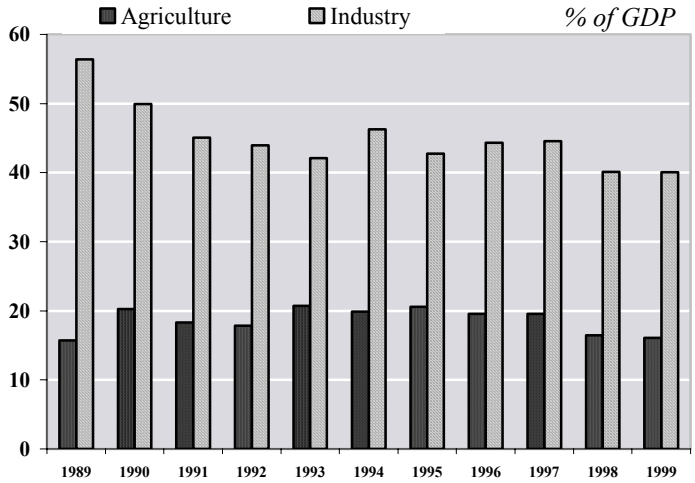
Industry and agriculture form the most important activities in the Romanian economy. The share of the industrial sector (value added as % of GDP) has declined by almost 10% over the past ten years. In 1999, agriculture contributed 16% to GDP. In 1980, Romania was one of the first countries in the Council for Mutual Economic Assistance (CMEA), the former economic coordinating body of the

Table I.3: Indicators of economic development, 1990-1999

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
GDP index *(1989 = 100)*	94.4	82.2	75.0	76.1	79.1	84.8	88.1	82.8	78.3	75.8
GDP *(% change over previous year)*	-5.6	-12.9	-8.8	1.5	3.9	7.1	3.9	-6.1	-5.4	-3.2
Public administration consumption index *(1989=100)*	114.1	126.1	128.9	132.3	146.8	148.3	150.5	137.8	137.2	122.3
Government budget deficit in GDP *(%)*	1.0	3.2	-4.6	-0.4	-2.4	-2.9	-4.1	-3.9	-4.1	-4.0
Annual inflation rate *(%)*	5.1	170.2	210.4	256.1	136.7	32.3	38.8	154.8	59.1	45.8
Consumer price index, annual mean *(previous year=100)*	105.1	270.2	310.7	356.2	237.1	132.2	138.8	254.9	159.3	145.8
Household consumption index *(1989=100)*	108.1	90.6	83.7	84.5	86.7	98.0	105.8	101.9	97.3	92.5
Wage earnings index *(Oct. 1990 = 100)*	100.0	81.7	71.3	59.4	59.4	66.5	72.7	56.3	58.2	58.4
Unemployment rate *(% of labour force)*	1.3	3.1	8.2	10.4	10.9	9.5	6.6	8.9	10.3	11.5
Export index *(1989=100)*	60.6	49.7	51.2	56.9	67.7	79.2	80.9	90.1	95.3	103.8
Import index *(1989=100)*	118.5	83.4	89.7	93.6	96.2	111.9	121.7	130.8	149.5	142.0
Total gross foreign debt *(billion US$)*	1.1	2.1	3.2	4.2	5.6	6.5	8.3	9.5	9.8	8.6
Foreign gross debt per capita *(US$)*	47.4	92.0	142.0	187.0	245.0	286.0	369.0	422.0	436.0	383.0

Source: National Commission for Statistics; National Bank of Romania and Foreign Trade Centre.

Figure I.3: Value added by industry and agriculture, 1989-1999



Source: World Bank, 2000.

Communist countries, to negotiate independent agreements with the European Community (EC). Romania's main exports are textiles and footwear (23%), metals and metal products (18%), machinery and equipment (9%) and chemicals (7%). In 1999, exports totalled US$ 8.505 billion (€ 7.6 billion). The collapse of CMEA in 1991 resulted for Romania in a loss of markets, as most of its exports used to go to other CMEA member countries. After Romania's initial struggle to find new markets in western Europe, its largest trading partner is now the European Union, accounting for 61% of its imports and 67% of its exports (at the end of May 1999). Exports to the EU in 1998 were worth € 4.8 billion (US$ 5.4 billion), while imports totalled € 6.1 billion (US$ 6.8 billion). Romania's main import commodities are machinery and equipment (23%), fuels and minerals (19%), chemicals (8%) and foodstuffs. Its imports amount to US$ 9.592 billion. Romania's external debt was estimated to be US$ 10 billion (€ 8.9 billion) in 1998.

Private property rights and a market economy are guaranteed in the Constitution. However, the Romanian Government has approached the privatization process cautiously, as many State-owned enterprises were not attractive to foreign investors. Thirty per cent of the shares in joint-stock and limited-liability companies are reserved for Romanians and are held in Private Ownership Funds per economic sector. The remaining 70 per cent of shares are available for purchase by foreign investors through the State Ownership Fund. By 1999, the State Ownership Fund had privatized around 7,000 companies. Some 7.7 million ha of agricultural land has also been privatized and returned to its former owners.

I.4 Institutions

Romania is a parliamentary republic headed by a president elected for a four-year term. The Constitution of 1991 provides for a separation of the executive, legislative and judicial branches of power. Romania's most recent elections were held in November and December 2000. According to Law No. 2/1968 on the Administrative Organization of the Territory of Romania and based on article No. 2 of Decree No. 38/1990, Romania is organized in the following administrative units: counties (*judet*), towns and communes. Bucharest has a separate status as a municipality, or *municipiu*. Various ministries, such as the Ministry of Public Finance, the Ministry of Waters and Environmental Protection, the Ministry of Agriculture, Food and Forests, the Ministry of Education and Research, and the Ministry of Health, have their own subordinate administrative entities at *judet* and local authority level in the form of inspectorates and public directorates. For example, the Ministry of Waters and Environmental Protection has 42 local Environmental Protection Inspectorates (EPIs) responsible for monitoring and inspections, and for controlling the implementation of regulations and

Box I.1 Relevant Romanian ministries*

Ministry of Foreign Affairs	Ministry of Health and the Family
Ministry of European Integration	Ministry of Tourism
Ministry of Public Finance	Ministry of Small and Medium-sized
Ministry of Education and Research	and Cooperative Enterprises
Ministry of National Defence	Ministry of Public Works, Transport and Housing
Ministry of the Interior	Ministry of Public Information
Ministry of Development and Prognosis	Ministry of Waters and Environmental Protection
Ministry of Labour and Social Solidarity	Ministry of Agriculture, Food and Forests
Ministry of Public Administration	Ministry of Industry and Mineral Resources

**as of early 2001, after the elections at the end of 2000*

of nature conservation measures. In all *judet* and in Bucharest, a *prefect* under the Ministry of Public Administration represents the central Government and supervises the legality of the self-government activities of local and *judet* councils and of mayors. Box I.1 provides an overview of ministries relevant to environmental management.

In June 1995, Romania applied for membership of the European Union. Romania receives technical and financial aid from the EU through various programmes such as the Assistance for Economic Restructuring in Central and Eastern European Countries (PHARE), the Instrument for Structural Policies for Pre-accession (ISPA) and the Special Accession Programme for Agriculture and Rural Development (SAPARD), in order to help it comply with the body of EU law and its the economic and political criteria. The Ministry for European Integration proposes initiatives for approval by the Government. At parliamentary level, the Commission for European Integration deals with EU accession issues. In 1999, a European Institute started activities to support administrative institutions in their accession preparations. It carries out impact analyses, manages the training of personnel in EU integration issues and negotiations and provides translations of relevant legislation. The Legislative Council checks the compatibility of bills and legislative proposals with EU legislation. At central level, this monitoring is carried out with the help of a database on approximation legislation.

In 2000, negotiations started between Romania and the European Union on small and medium-sized enterprises, science and research, education and training, external relations, and common foreign and security policy.

PART I: ENVIRONMENTAL POLICY AND MANAGEMENT

Chapter 1

LEGAL AND POLICY FRAMEWORK, INSTITUTIONAL ARRANGEMENTS AND ENVIRONMENTAL REGULATIONS

1.1 Legal framework for environmental protection

The new legal system in Romania is based on the Constitution of 1991. Statutory control is provided by legal acts comprising: (i) primary legislation, i.e. laws and so-called *urgent* ordinances (i.e. temporary laws passed by the Government for immediate implementation, but not submitted to the debates and approval of Parliament; they are transformed later into normal laws, after being submitted to and discussed in Parliament); and (ii) secondary legislation in the form of government decisions, ministerial orders and instructions, which are legally binding.

Secondary legislation is aimed at the implementation and the enforcement of existing laws and urgent ordinances. Government decisions are approved by the Cabinet of Ministers and are applicable to all ministries and governmental institutions. Ministerial orders can be issued by one or more ministers, e.g. the Minister of Waters and Environmental Protection and the Minister of Health or the Minister of Agriculture, Food and Forests, and are mandatory. Regulations and instructions are issued to give further guidance and to indicate how to implement specific provisions in the government decisions and ministerial orders.

Environmental protection has its framework law, i.e. the Law on Environmental Protection No. 137/1995. The major provisions set out in the Law include the following:

- The principles and strategic elements that are the basis of the laws;
- The right to access information on environmental quality;
- The right to information and consultation on the siting of industrial facilities as set out in the Law on Environmental Impact Assessment;
- The implementation of environmental impact assessments, the results of which are to be made available to the public;
- The establishment of liabilities regarding environmental quality rehabilitation;
- The regime of dangerous substances, hazardous waste, chemical fertilizers and pesticides;
- The protection against ionizing radiation and safety of radiation sources;
- The protection of natural resources and biodiversity conservation;
- Prompt action and reporting when accidental pollution occurs;
- The prerogatives and responsibilities of the environmental protection authorities, central and local authorities, natural and legal persons;
- The right to appeal to the administrative or judicial authorities.

According to article 88 of this Law, special laws have been drawn up such as: the Forest Code (No. 26/1996); the Law on the Hunting Fund and the Protection of Game (No. 103/1996); the Law on Water (No. 107/1996); and the Law on the Safe Deployment of Nuclear Activities (No. 111/1996).

The Forest Code establishes the State's Public Property Forest Fund and the Private Property Forest Fund and sets out requirements for administering and ensuring the protection and development of the forest funds.

The Law on the Hunting Fund and the Protection of Game provides that, except for hunting sport and other specifically designated needs: "the hunting fund of Romania is a natural resource of national and international interest, and shall be managed and administered for the purpose of conservation of the wild fauna's diversity and the maintenance of the ecological balance".

In 2000, several other important laws were adopted: Law No. 73/2000 on the Environmental Fund, Urgent Ordinance No. 78/2000 on Waste Management (since enacted as Law No. 426/2001), Urgent Ordinance No. 243/2000 on Atmosphere Protection, Urgent Ordinance No. 200/2000 on the Protection of Natural Areas, Urgent Ordinance No. 236/2000 on the Protection of Habitats, and Wild Fauna and Flora Species (now Law No. 462/2001), Urgent Ordinance No. 49/2000 on Genetically Modified Organisms (GMOs), Urgent Ordinance No. 89/1999 on the Trade in and Restrictions on the use of ozone-depleting substances (now Law No. 159/2000) and the draft law on cultivated plants and pesticides. The Urgent Ordinances on Atmosphere Protection, on GMOs and on the Protection of Natural Areas are all before the Parliament for discussion and transformation into normal laws.

The most important secondary legislation is linked to the environmental impact assessment and licensing procedure. In this regard the Ministry of Waters and Environmental Protection (MWEP) has issued (i) Ministerial Order No. 125/1996 on the setting-up of a licensing procedure for economic and social activities with an environmental impact and (ii) Ministerial Order No. 184/1997 for the approval of the environmental audit completion procedure. The latter was based on some parts of Ministerial Order No. 125/1996 that were further improved regarding the evaluation of the impact of existing facilities.

In the period 1998-2000, the MWEP issued a number of government decisions and ministerial orders on environmental protection, such as:

- Government Decision No. 155/1999 on adopting the European Waste Catalogue and the list of hazardous waste;
- Government Decision No. 173/2000 on regulation of the special regime governing the control and the management of PCB/PCTs;
- Ministerial Order No. 699/1999 on the procedure and competency for issuing water authorizations.

Other laws or ordinances aimed at effectively ratifying international agreements and conventions have been passed, e.g. the adoption of the Copenhagen Amendment to the Montreal Protocol (adopted by Law No. 9/2000), the bilateral cooperation with Germany (approved by government decision.), the Law on the ratification of the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention, adopted by Law No. 86/2000). The Law on ratifying the Kyoto Protocol has recently been adopted as Law No. 3/2001. Over the past eight years Romania has ratified the most important international environmental conventions and agreements (see Chapter 5).

According to existing legislation, for a standard to be compulsory it must figure in a legally binding text, e.g. some environmental standards for waste-water discharges and air emissions are made compulsory by ministerial order.

1.2 Objectives of the environmental policy

The gist of the environmental policies is set out in the Governmental Programme and action plan for the next four years, and is expressed in the National Medium-term Development Strategy of the Romanian Economy. A second key process that shapes the environmental policies is the EU Accession Partnership, which contains clear environmental targets in line with the overall objectives of EU environmental policies. The National Programme for the Adoption of the *EU body of law* specifies the priorities of the country and is regularly updated. Finally, the National Environmental Action Plan, which puts in practice the National Environmental Strategy, is also regularly updated. It contains a series of projects that are progressively incorporated into the NAAP when they fully match the EU targets.

In 1995, following the 1993 Lucerne Ministerial Conference on Environment, the Ministry of Waters and Environmental Protection drew up a National Environmental Protection Strategy and a National Environmental Action Plan (NEAP) with the technical and financial support of the Danish Environmental Protection Agency (DEPA) in cooperation with the National Research-Development Institute for Environmental Protection (ICIM). The NEAP was presented to the Ministerial Conference 'Environment for Europe' in Sofia in October 1995, before the Romanian Government approved it.

Activity within the NEAP has continued by updating the projects included on the list of short- and medium-term priority projects and by implementing them using different economic instruments. The most recent version of the NEAP

Box 1.1: List of basic environmental laws

- Law on Environmental Protection No. 137/29.12.1995 (OG No. 304/30.12.1995)
- Forest Code No. 26/24.04.1996 (OG No. 93/8.05.1996)
- Law on the Hunting Fund and the Protection of Game No. 103/23.09.1996 (OG No. 235/27.09.1996)
- Water Law No. 107/25.09.1996 (OG No. 244/8.10.1996)
- Law on the Environmental Fund No. 73/2000 (OG No. 207/11.05.2000)
- Law on Waste Management No. 426/2001 (OG No. 243/2000)
- Urgent Ordinance on Atmosphere Protection (OG No. 243/2000)
- Law on the Safe Deployment of Nuclear Activities (OG No.111/1996)

Note: OG = Official Gazette

was drafted at ICIM-Bucharest in 1998 and contains all the main objectives for sectoral strategies, including agriculture and transport.

The list of priority projects that were included in the updated version of the NEAP was based on the data provided by the local structures. The NEAP (1999-2000) includes 286 projects, of which 233 projects are on the short-term list and 53 on the medium-term list. The total value of the projects on this short-term list is estimated at € 2,276.5 million.

By Government Decision No. 540/1998, the coordination of the NEAP was assigned to the Inter-ministerial Committee for the Promotion and Follow-up of the NEAP chaired by the Ministry of Waters and Environmental Protection. This Committee also includes representatives of the Ministries of Public Works, Transport and Housing, of Industry and Resources, and of Agriculture, Food and Forests. Since May 1999, the Department for Authorization and Certification of the MWEP has been responsible for the technical secretariat of the NEAP.

The NEAP complies with the general principles and priority objectives of the Romanian Environmental Protection Strategy (1995). This Strategy was also updated in 2000 and represents a unitary and integrating approach to the environmental protection issues in the country. The Environmental Protection Strategy for the period 2000-2004 was prepared according to the following general environmental protection principles:

- Maintaining and improving the population's health and quality of life;
- Maintaining and improving the natural heritage through sustainable development;
- Preventing natural disasters and accidents;
- Complying with international environmental agreements.

At the same time, the NEAP is being updated according to the National Programme for the adoption of the EU body of law, becoming a basic element of the conditions to be fulfilled for integration in the European Union structures.

The main issue in the NEAP implementation is the provision of the necessary financial resources. In addition to the traditional financial sources, which already exist (domestic sources, local and State budgets), new sources can be identified which will depend on the adoption of legal regulations on economic incentives for environmental protection and on the creation of the environmental fund and funds received from the EU through PHARE and ISPA (See more details in Chapter 3).

At the level of the local Environmental Protection Inspectorates and with the help of enterprises, the representatives of the local administration and civil society, Local Environmental Action Plans (LEAPs) are being drawn up and authorized by the respective County Councils. In contrast with the NEAP, these plans include objectives of local interest for communities with over 2,000 inhabitants. Several LEAPs (Bacau, Piatra Neamt, Baia Mare, Deva and Resita) have already been drawn up and five others are in the pipeline. Progress is slow as neither the local nor the national level has enough capacity to draw up the plans.

The 1995 Law on Environmental Protection, article 64, paragraph 1, gives the central environmental protection authority the responsibility for drawing up and promoting a national environmental strategy for sustainable development. In 1997, the United Nations Development Programme (UNDP) established a

National Centre for Sustainable Development. In cooperation with various partners in Romanian society, such as academics, NGOs and government representatives, a working group was formed and produced the National Strategy on Sustainable Development (NSSD). Civil society also participated in the drawing-up of the NSSD. This Strategy was presented in July 1999 and assessed the potential and needs for sustainable development until 2020. The Romanian Strategy for Sustainable Development was set up by Government Decision No. 305/1999.

A number of other specific environmental strategies have also been drawn up in the framework of the EU accession preparations, such as the National Forest Management Strategy, the Approximation Strategy on Air Pollution and Climate Change (1999), the National Water Management Strategy, the Approximation Strategy on Industrial Pollution Control (1999) and the Medium-term Strategy to Combat Desertification and Drought (2000-2020). In 1996, the National Strategy and the National Action Plan for Biological Diversity Conservation and Sustainable Use of its Components were drawn up. These include objectives and measures following the Pan-European Biological and Landscape Diversity Strategy and the provisions of the main international conventions and agreements in the field.

The Strategy and Action Plan for the Danube River were adopted by the 11 Environment Ministers of the Danube watershed area and by the EU Commission in December 1994 in Bucharest. The National Strategic Action Plan for the Black Sea was presented and accepted at the Conference of the Environment Ministers of the Black Sea Riparian Countries in Istanbul (October 1996), and was followed by the National Action Plan for the Black Sea. This Plan represents the Romanian Government's environmental policy for the Black Sea as expressed in the Environmental Protection Strategy and for this reason its objectives comply with those in the National Action Plan for Environmental Protection. Moreover, a special Management Plan for the Danube Delta was developed in 1994 and a National Health and Environmental Action Plan (NEHAP) in 1996.

Thus, a wide variety of documents reflecting the objectives of the environmental policy have been prepared. However, concrete implementing programmes with implementation mechanisms and the corresponding funding are lacking, which explains why there is no effective implementation of the above strategies. Problem-oriented programmes at national and local level would be needed to set the existing strategies in motion.

As part of the integration of environmental policies into sectoral policies, both the National Development Plan and the National Plan for Agriculture and Rural Development include an environmental chapter. Their approval by the European Commission represents a precondition for the EU Regional PHARE Programme 2000 and the Special Accession Programme for Agriculture and Rural Development (SAPARD), respectively. The Romanian strategy for the implementation of the EU Instrument for Structural Policies for Pre-Accession (ISPA) was approved in July 2000 and a National Programme for the adoption of the EU body of law (NPAA) has been prepared.

EU approximation process

The invitation to Romania to start negotiations for accession to the European Union opened a new perspective for enhancing the harmonization in environmental protection. In 1999, this process speeded up, regarding the integration of environmental policies within other sectoral policies and the need to strengthen the national and local institutional capacity to implement and enforce the provisions of the newly transposed legislation.

In June 1999, Romania presented a revised National Programme for the adoption of the EU body of law (NPAA), in which it outlined its strategy for accession, including how to achieve priorities contained in the Accession Partnership. This National Programme prevails over national strategies, which are progressively adjusted to it (for instance the 1999 Approximation Strategy on Air Pollution and Climate Change and the 1999 Approximation Strategy on Industrial Pollution Control).

In May 2000, at the request of the EU and as a prerequisite for progress, Romania also issued the *National Medium-term Development Strategy of the Romanian Economy*. Romania reaffirms there its objectives, priorities and main tasks at a time when the country is engaging itself firmly in the EU accession process. The Strategy devotes a special chapter to environmental protection and local and regional planning issues.

As mentioned above, the adjustment of the legislative measures was preceded by the drawing-

up of legislative approximation strategies in: air quality and climate change, industrial pollution control and risk management, water quality, waste management, chemical substances and ozone-depleting substances, protection of nature and genetically modified organisms, horizontal legislation, forestry, noise and vibrations and civil defence.

To accelerate the legislative harmonization process, through Ministerial Order No. 600/1999, amended by Ministerial Order No. 1028/1999, working groups were set up for each sector of the EU body of law. These working groups consist of representatives of the MWEP and its subordinated structures, as well as of the ministries involved in environmental protection, to draw up the sectoral strategies and drafts of legal acts to transpose the provisions of the EU body of law. All recently prepared and adopted laws, government decisions and ministerial orders are the result of the activity of these working groups.

Referring to the requirements of the EU body of law on horizontal legislation, Law No. 22/2001 on the ratification of the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) has been approved by Parliament and by the end of 2001 the Law on Environmental Protection (No. 137/1995) is likely to be amended so as to fully transpose the list of activities with an environmental impact that is included in EU Directive 85/337/EEC, amended by EU Directive 97/11.

Progress (status of July 2000) in the transposition of the EU Directives into the national legislation of Romania is shown in Figure 1.1. In the short term (2000-2001), the Accession Partnership sets out the following priorities:

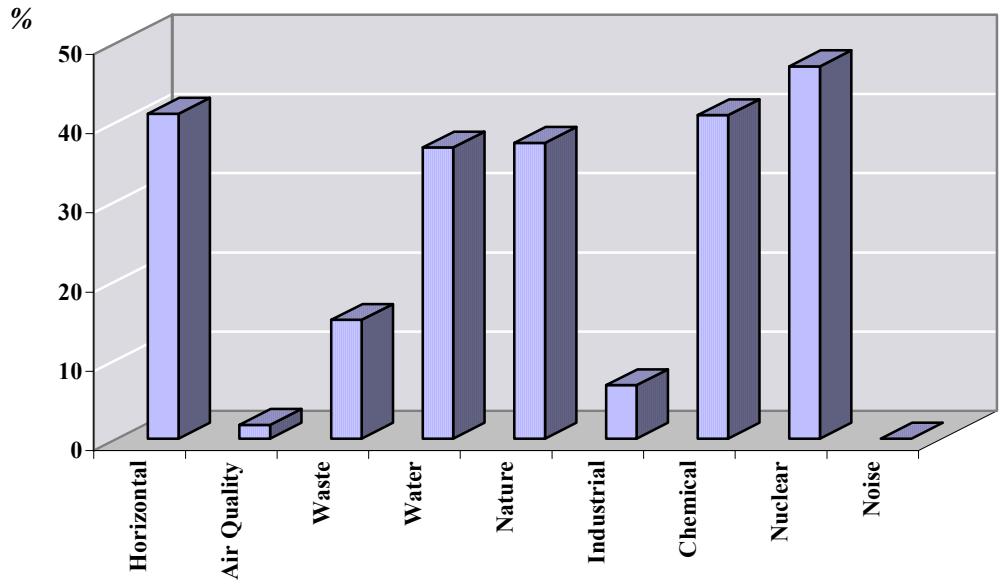
- Prepare and finalize the sectoral strategies for legislative approximation and enforcement and their integration into an overall approximation strategy in environmental protection;
- Transpose environmental legislation, especially that referring to environmental impact assessment, information access, nature protection and water quality;
- Promote the legislation on air quality;
- Promote a governmental decision on integrated pollution prevention and control (IPPC);
- Prepare a financial strategy, and detailed financial plans especially for "costly" directives, based on a realistic estimation of annual financial sources, both public and private;
- Develop, within the MWEP, structures to contribute to the acceleration of the harmonization with the EU body of environmental law (Directorate for industrial pollution control, Directorate for waste management and dangerous chemicals);
- Develop a structure, as a legal person, to coordinate the environmental fund, and a viable financial mechanism for environmental investments;
- Strengthen the national and local institutional capacity for the effective implementation of the transposed legislation.

Implementation and control are mainly medium-term activities. They are based on the transposed legislation (process coordinated by the MWEP) aimed at decentralizing the administrative responsibilities and ensuring a proper structure capable of acting at local level. This is intended to be backed up by an efficient monitoring of environmental quality and by endowing the laboratories with efficient equipment. Thus, the medium-term priorities (2002-2003) are to:

- Continue to implement the harmonization programmes, first of all in air, water and waste;
- Transpose the EU body of law regarding chemical substances and industrial pollution (Directives on IPPC, Large Combustion Plants, SEVESO II) and begin the transposition of the Directive on Noise;
- Develop the monitoring and enforcement capacity, mainly by decentralizing the MWEP activity and by involving the Environmental Protection Inspectorates in this process;
- Endow them with efficient equipment in order to effect adequate monitoring of the implementation and enforcement of the new legislation;
- Invest in environmental infrastructures;
- Continue to train the MWEP and Environmental Protection Inspectorates (EPIs) personnel.

According to the timetable for the harmonization of legislation, the deadline for the transposition of the EU environmental directives into the national legislation is 2003, but for some directives it will be

Figure 1.1: Progress in the transposition of EU environmental legislation by sector, July 2000



Source : Ministry of Waters and Environmental Protection, 2000

financed by the European Commission for legislative harmonization in the environmental field compared to the real existing possibilities suggest a likely extension of the term to 2007 for the total transposition of the EU body of environmental law.

The final stage of implementation of the EU body of environmental law is foreseen for 2030 in urban waste-water treatment and the phasing-out of the discharge of certain dangerous substances into surface water. The financial aspects implied by the implementation and the enforcement of the new legislation, mainly with regard to the "costly" directives, mean that this term will probably be prolonged after the start of negotiations on environmental protection.

1.3 Institutional arrangements

The Ministry of Waters and Environmental Protection and related institutions

According to the provisions of the Law on Environmental Protection (No. 137/1995), article 7, the authorities responsible for environmental protection are "the central authority for environmental protection and its local agencies". The central authority is the Ministry of Waters and Environmental Protection (MWEP), the local Environmental Protection Inspectorates and the administration of the Danube Delta Reserve.

By Government Decision No. 17/2001 on the structure and working of the MWEP and other legal rules, measures have been taken to restructure the Ministry and its subordinated institutions. The most important change was the shift of the responsibilities regarding forest management to the Ministry of Agriculture, Food and Forests, though the MWEP is still responsible for forest protection. The Ministry has four State secretaries and is organized into three General Directorates, several Directorates and a State Inspectorate with a staff of approximately 200 people. In 2001 a special division for hazardous chemicals and waste management was created. The organizational chart of MWEP is given in Figure 1.2.

The MWEP is responsible for the development of general environmental policy and legislation and for the monitoring and the control of their implementation in the field of waters and environmental protection. It also collects data on the state of the environment and makes them available to the general public (See Chapter 4).

In the EU approximation process the MWEP has the following main tasks:

- Coordinating the entire implementation of national environmental and water legislation;

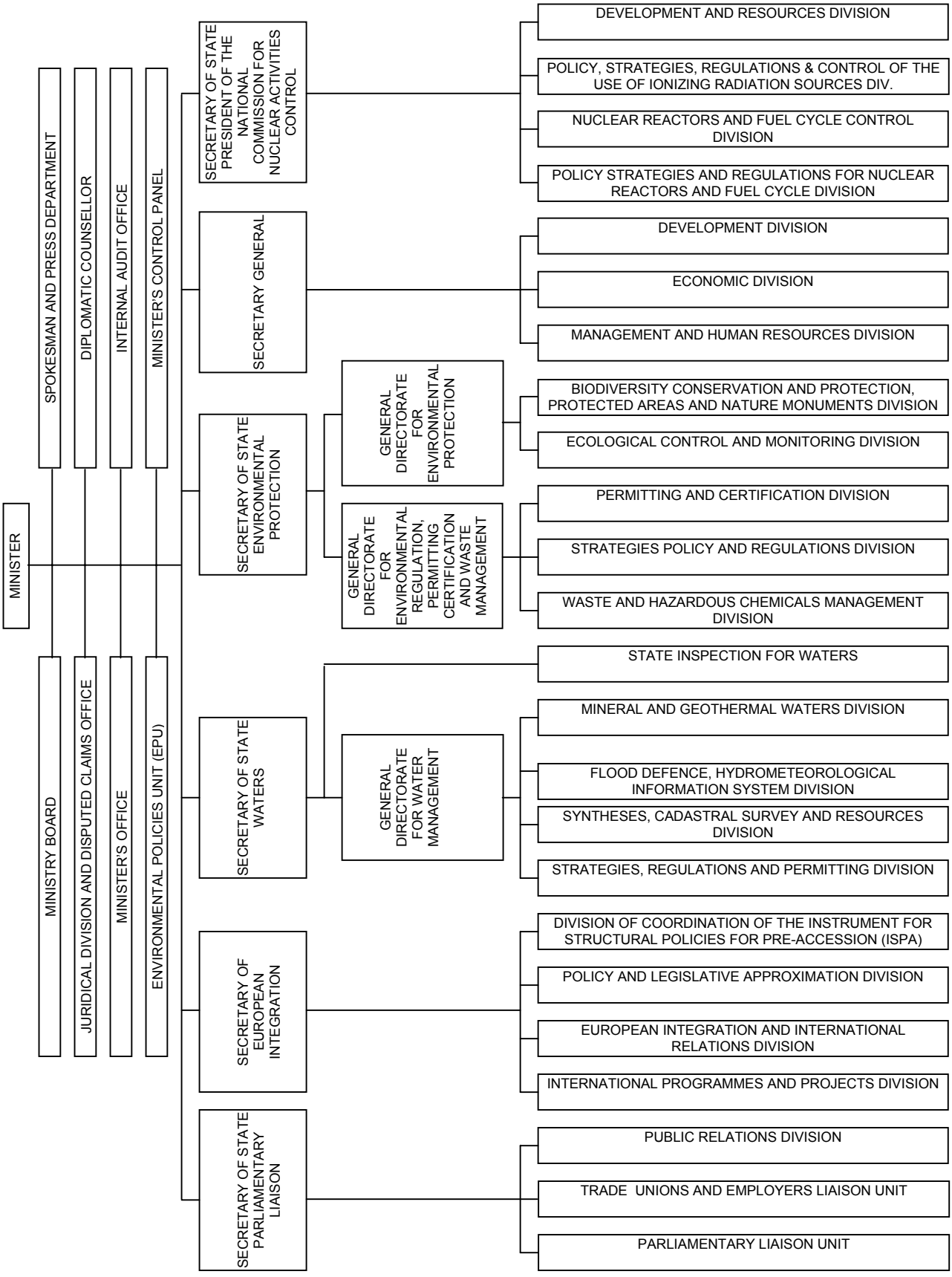


Figure 1.2: Structure of the Ministry of Waters and Environmental Protection

- Coordinating the information system of the harmonization process (in relation with the monitoring of progress, public information, consultation and public participation);
- Coordinating the activities of the Environmental Protection Inspectorates at local level, the Biosphere Authority and the Romanian Water Authority.

Following the implementation of ISPA, which started on 1 January 2000, an ISPA Projects Management Unit has been established within the MWEP. This Unit supports project beneficiaries that have to improve the project proposal with technical details. This practical support is provided in a written form as a guidance manual and by appropriate training and guidelines.

Romania has a decentralized environmental protection management system. There are 42 local Environmental Protection Inspectorates (EPIs) subordinated to the MWEP that play a key role in the enforcement of legislation. Of the 42, 41 are located in the respective counties and the last one covers the Bucharest Municipality. A special authority was created in 1990 for the management of the 600,000 ha Danube Delta Biosphere Reserve. Most of the activities on implementation and enforcement of environmental legislation have to be carried out by the EPIs. Their main functions are:

- Issuing permits to all listed activities with a potential impact on the environment;
- Conducting environmental inspections;
- Monitoring ambient air quality and air emissions;
- Reporting periodically to the MWEP.

In 1999, the local EPIs were reorganized (Ministerial Order No. 818/07.09.1999). Now, there is a department for international programmes, public and NGO relations within each inspectorate. This department will channel the development of capacities that are required for identifying and implementing the harmonization strategies. Since Decision No. 104/1999, each EPI also has a nature conservation and biological diversity service. The local EPIs have a total staff of 2,175.

There are also a number of institutes that depend on the Ministry, such as the Danube Delta Biosphere Reserve Authority, the National Research-Development Institute for Environmental Protection (ICIM), the Romanian Water Authority S.A. (Apele Romane), the Danube Delta National Research Institute (DDNRI), the National Institute for Marine Research and Development – Constanta and the National Agency for the Monitoring of Environmental Radioactivity.

The EU accession process and the resulting dynamic changes in legislation complicate the task of the national institutions. Communication between the national institutions (MWEP and ICIM) and the local EPIs seems to be efficient and well organized.

The National Research-Development Institute for Environmental Protection (ICIM), now under the MWEP, plays an important role in the overall functioning of the MWEP. It supports the Ministry in the preparation of draft environmental strategies and legislation and in the publication of the State-of-the-Environment Report, in the harmonization process, environmental monitoring and the coordination of the data provided by the local EPIs. It also performs theoretical and applied studies and research in environmental protection and engineering, focusing on water, air, waste and technology. The Institute is technically well equipped. It has national reference laboratories for water, waste, air, noise and vibration, radioactivity and geotechnology. It serves as a reference body for the conservation of the Danube river areas under the Danube Convention and also helps the Ministry in the collaboration required under other international agreements. Although fulfilling the role of a national environmental agency, ICIM has no regular income secured from the State budget.70% of its funding is contractual (EIA studies, environmental audits and projects with foreign financing) and the remaining 30% comes from the MWEP and the Ministry of Education and Research.
The Institute of Meteorology, Hydrology and Water Management, under the MWEP since early 2001, monitors, forecasts and carries out research on meteorology, hydrology (flood forecast and Alert Centre) and water resource management. It also provides the MWEP with information on the ozone layer and wind speed.

Other ministries and institutes

The legal framework for environmental responsibilities of other ministries and institutions was broadly defined in chapter IV of the Law on Environmental Protection (No. 137/1995).

The Ministry of Health and the Family collaborates in the development of air protection legislation and defines air quality standards with the help of the Institute for Standardization (ASRO). The Institute of Public Health, subordinated to the Ministry of Health and the Family, is responsible for air quality monitoring, mainly in the workplace (indoor air), although it also has a network for monitoring outdoor air. In particular, it has carried out some monitoring of air quality at major crossroads in Bucharest. It participates in the development of standards through the technical committees working under ASRO on a voluntary basis. In addition, County Public Health Offices also carry out air quality monitoring for health purposes and send the results to the Ministry.

The Ministry of Public Works, Transport and Housing now also covers spatial planning (since 2001). It is responsible for the development of policy and legislation on transport-related emissions to air and on the spatial plan for territorial management.

Currently, the Ministry of Industry and Mineral Resources is responsible for policy and legislation on fuel quality. However, it has no responsibility for setting technical standards. This is the responsibility of ASRO, formerly the Romanian Standards Institute. ASRO can be asked to develop standards in a particular field. The Ministry has no legal power to compel industry to monitor its emissions, but has requested that the Environmental Protection Inspectorates at the local level introduce requirements for self-monitoring of emissions to both air and water into the permits for industry. It is the responsibility of the Ministry of Industry and Mineral Resources to introduce taxes on the sulphur content of fuel oil and the lead content of petrol. The Ministry has also developed a plan for phasing out leaded petrol. It will soon start work to transpose the Noise Directive in cooperation with the MWEP.

The Ministry of Public Administration, with the assistance and the approval of MWEP, develops restructuring programmes in line with the National Environmental Strategy and environmental policies. It assists economic actors in the implementation of compliance programmes and draws up environmental norms and regulations specific to their respective fields of activity.

The Ministry of Education and Research adopts education plans at all levels for the purpose of instilling notions and principles of ecology and environmental protection and raising environmental awareness. The Ministry also promotes study themes and research programmes covering the priorities set by the central environmental protection authority.

The Ministry of Agriculture, Food and Forests and MWEP supervise and control the enforcement of the regulations regarding chemical fertilizers, pesticides and forest protection.

The Ministry of Tourism and the Ministry of Youth and Sport develop educational programmes for the purpose of stimulating environmentally responsible behaviour and encouraging the application of ecotourism principles.

The Ministry of Interior supports MWEP when needed.

The Ministry of National Defence develops specific norms and guidelines consistent with the internal legislation and the ecological principles for environmental protection within its scope of activity.

The NEAP triggers collaboration on environmental protection among all responsible ministries and institutions. The MWEP chairs the Inter-ministerial Committee that coordinates the NEAP and will determine the priorities for funding by the environmental fund. The NEAP includes priorities for all economic sectors (transport, industry, agriculture).

The same coordinating mechanisms were put in place regarding the National Programme for the adoption of the EU body of environmental law. The sectoral working groups established by Ministerial Order No. 600/1999 within the harmonization process offer another opportunity for coordination on environmental policy and legislation.

The coordination of environmental decisions with industry, NGOs and the academic community has been enhanced with the practical implementation of the environmental impact assessment procedure.

1.4 Environmental regulations

Regulatory instruments

Environmental impact assessment

The legal provisions for environmental impact assessment (EIA) are set out in the Law on Environmental Protection (No. 137/1995).

Following the provisions contained in article 3, paragraph (a), any development of a new facility or modification of an existing one requires the approval of an EIA before the "operating approval" can be obtained (in most cases) from the local environmental inspectorates. The Law defines the main features of the EIA: the steps of the procedure, the requirements from the natural or legal persons preparing the impact study, the list of activities which are subject to the EIA procedure for the issuing of the environmental agreement and/or permit.

The detailed procedures for activities with an environmental impact are presented in Ministerial Order No. 125/1996. The Order also provides guidance to the competent authorities on issuing the environmental permit, defines the procedure for public debate, the methodology for preparing the environmental impact study (EIS), the form and standard content of the environmental permit. The general scheme of Romania's EIA procedure is shown in Figure 1.3.

The EIA procedure consists of (i) a preliminary stage, (ii) a main stage, (iii) an analysis and (iv) a validation stage. The central and local environmental protection authorities issue the environmental permit for those activities listed in annex II to the Law in accordance with the sharing of responsibilities provided by Ministerial Order No. 125/1996. The MWEP is the competent authority for issuing permits for major projects and for international and transboundary projects. For all smaller projects, the competency lies with the local EPIs.

The environmental impact study is part of the documentation prepared by the proponent in order to obtain a licence, called "environmental permit", for investment in the proposed project. It is prepared by specialized units, natural or legal persons, certified by the Ministry. The competent authority decides in consultation with the proponent when an EIA with an impact study is required. The public notification and the public hearing are announced after the environmental authority accepts the study (See Chapter 4). The decision on EIA is made public and motivated. The agreement is issued within 30 days at most after the final decision. However, the decision-making process is confused by the absence of a deadline in the course of the procedure and for the issue of the final decision. The conditions under which public opinion should be taken into consideration are not explicitly stated. Moreover, the list of facilities that should be submitted to an EIA (annex II) does not fully comply with the EU list and is being completed by the MWEP.

For any activities not covered in the list of mandatory EIA (annex II to the Law), the local EPIs use selection criteria to establish whether such activities can have a significant environmental impact. In general, environmental agreements are valid for five years.

Licensing

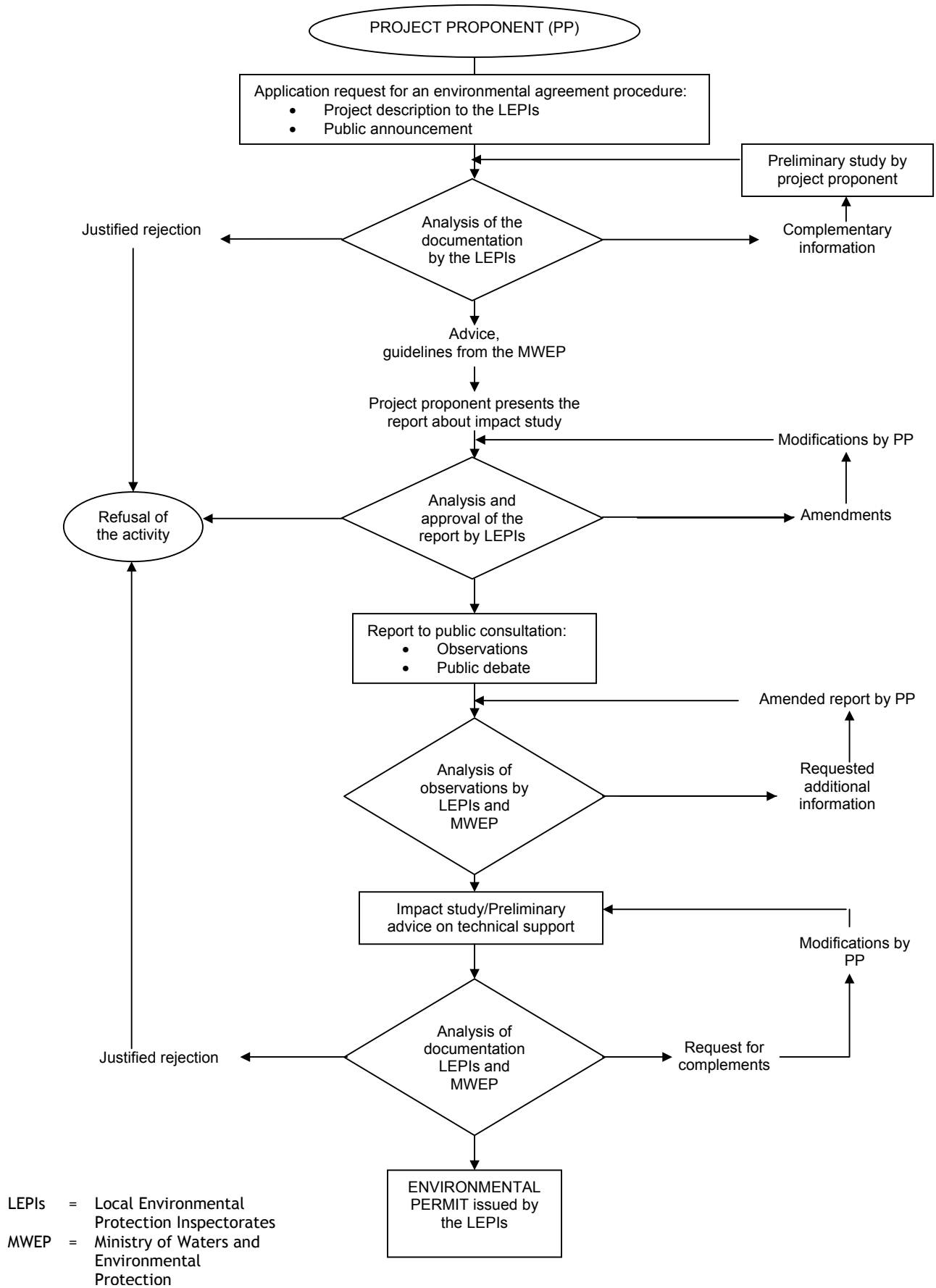
The licensing system in Romania is well developed. The legal requirements for an environmental permit are set out in the Law on Environmental Protection (No. 137/1995) and in Ministerial Order No. 184/1997 for the approval of the environmental audit. Existing facilities require an environmental authorization (permit) from the local EPIs, which includes assessment of compliance with the environmental standards and other regulatory requirements. Conditions relating to air, water and soil, which reflect existing standards or more stringent norms set by ministerial order, may be attached to the permit.

The environmental audit (also called Ecological Balance) of existing facilities is carried out in three stages – phase 0, phase I and phase II -- entailing:

- Phase 0 – a checklist including characteristic elements of the activity which help the competent authority to identify the need for a phase I or phase II environmental audit;
- Phase I – an environmental study consisting of data collection and documentation (with no sampling or analysis of the environmental media) including all the elements of the technical review of environmental aspects, before taking a decision on the scale of potential or existing environmental impacts from a site;
- Phase II – site investigations undertaken within the framework of an environmental audit, in order to quantify the potential scale of contamination of a site through sampling and the chemical or physical analysis of various media.

Based on the background file of the proponent, the local EPIs decide on the legally required phases. Phases I and II of the environmental audits and risk assessments can be carried out only by certified natural or legal persons paid by the proponent.

Figure 1.3: Procedure for issuing an environment agreement for a new project (EIA procedure or environmental accord)



In the privatization process, the investor should consider carrying out a pre-acquisition audit to determine if the facility complies with environmental legislation and whether any liability exists, and discuss potential liability issues with the authorities. For these reasons, the environmental audit in three stages described above was developed for enterprises under privatization. In practice, this approach is not followed because the period in which the audit has to be done is very short. The risk assessment especially cannot be implemented properly since it is very expensive and time-consuming.

Compliance programmes may be required as a result of the environmental audit as well as following an inspection in case of non-compliance. The present shortage of funds in industry often prevents companies from implementing compliance plans.

The validity of the environmental permit is a maximum of 5 years.

Standards

Ambient standards

Historically, Romania has followed the environmental quality approach to standard setting, imposing limits on levels of pollutants in the environment (environmental quality or ambient standards) rather than limits on releases to the environment (emission standards). Currently there are ambient standards for air and immission standards for certain substances discharged to water. Romanian ambient standards will be harmonized with EU ambient standards. The intention is to apply new standards first to new facilities and only gradually to existing ones.

Emission limits

Emission limits for individual permits are calculated on the basis of ambient quality standards and take into account environmental factors such as the dilution factors, the volume and category of water to which a discharge is made, other activities in the surroundings and climatic factors. There are no technology-based standards.

Other instruments

Monitoring

In the current NEAP, one of the medium-term priorities points to the need for an integrated system of environmental monitoring as a tool for a *preventive* strategy. The basic units of the National Information System on the Environment are the 42 local Environmental Protection Inspectorates (EPIs). They are in charge of monitoring ambient air quality and emissions to air, while a parallel measurement is carried out by the Ministry of Health. The local inspectorates also measure emissions into waters and check the quality of surface (lakes and rivers) and groundwaters that are monitored by the National Water Authority, Apele Romane. Other agencies and public bodies are in charge of measurements and the production of environmental data: ICIM, the National Agency for Forests, the Soil Research Institute, the Forest Research Institute, the Institute for Research in Energy Production, the Institute of Hydrology and Meteorology and other ministries (Ministry of Public Works, Transport and Housing, Ministry of Agriculture, Food and Forests, Ministry of Industry and Mineral Resources, Ministry of Health). The National Commission for Nuclear Activities Control (NCNAC) is in charge of the national radioactivity surveillance programme, which consists of routine radioactive monitoring and control around nuclear facilities and environmental radioactivity surveillance over the national territory.

In 2000, the MWEP started to compile the environmental data from all institutional sources through the recently created "National Integrated Monitoring System," placed within its Ecological Control and Monitoring Division. This small team is responsible for the coordination of all data from the local and national institutional network, with the aim of providing reliable information on the current state of the environment, raising the alarm about critical factors, and foreseeing their evolution. It also has to centralize *ex-post* data on accidental pollution, such as the Baia Mare accident (See description in Chapter 7, Box 7, and in Chapter 10, Box 10.3).

Additional information on environmental monitoring can be found in Chapters 6, 7, 8, 9, 10 and 14.

Environmental management systems

The Law on Environmental Protection includes general provisions, which require that the production process and technology be as clean as possible. The ISO 14000 standard for the introduction and development of environmental management systems has not been adopted by Romania. There are no provisions in the existing

legislation to introduce the Eco Management and Audit Scheme (EMAS) on a voluntary basis for industrial enterprises. The transposition of EEC Regulation 1836/93 (EMAS Regulation) is envisaged for the year 2007.

Enforcement of the legislation and compliance mechanisms

The enforcement of environmental legislation relating to commercial and industrial activities is the responsibility of MWEP and its local EPI. The State Inspectorate undertakes some of the inspections and has a supervisory role over the inspections by the local EPIs. The State Inspectorate cooperates with other Ministries, e.g. health, industry, agriculture, and with local authorities and the police in the enforcement process.

The local EPIs are required to prepare annual plans for the inspections they undertake. Inspectorates must report quarterly on their success in meeting the targets set in the annual plan. While theoretically available to the public, the quarterly EPI reports are not sufficiently publicized. The local EPIs are responsible for the enforcement of environmental legislation/regulations in industrial facilities, agricultural units, public works and all other polluting activities.

Both the Ministry's and the Inspectorates' inspectors may inspect facilities. Each Ministry's inspector is responsible for supervising the enforcement activities of three or four local EPIs and accompanies EPIs' inspectors on site visits according to an inspection programme. The Inspectorate's report is then addressed to the Chief Inspector at the Ministry. EPIs' Inspectors check compliance and advise operators on how to meet standards and permit conditions. Through MO No. 541/2000, the integrated control of all the environmental media (air, water, waste) is in place.

A facility that does not comply with the relevant standards or permit is first given a warning by the inspector. If the facility does not take the necessary steps, an administrative fine may be imposed by the inspector. The size of the fine is prescribed in the legislation. Ultimately, non-compliance may result in court action. Many facilities do not meet the relevant standards. According to the legislation, facilities must upgrade operations to comply with standards or face shut down. In practice, this does not happen and enforcement relies on fines. Where existing facilities do not meet relevant standards, it is the aim of the enforcement authorities to introduce gradual upgrading schedules.

1.5 Conclusions and recommendations

In Romania, the legislative process has been substantially accelerated with the EU approximation process. Existing environmental legislation has much improved and will be comprehensive enough, as soon as the large domains of air protection, waste management and protected areas management are fully regulated. In the year 2000, four very important laws (or urgent ordinances) were adopted: the Law on the Environmental Fund, the Urgent Ordinance on Waste Management, the Urgent Ordinance on Atmosphere Protection and the Urgent Ordinance on the Protection of Natural Areas. In addition, a number of government decisions and ministerial orders which regulate the implementation of legislation have been prepared and approved. Thus, the legal framework of sectoral laws is expected to be completed by the end of 2001.

In comparison with legislation, the preparation of environmental strategies and action plans started even earlier and has been expanded as far as possible. Over the past three or four years, many action plans have been drawn up, both at Government level and within the Ministry of Waters and Environmental Protection. The number and the variety of the strategic documents for environmental protection are impressive. The latest two examples are the 'Action plan for a Government Programme for 2000-2004' and the NEAP 2000-2004. These plans clearly specify the links and the required coordination between various Ministries in implementing the proposed actions. However, this is not enough if they are to play a substantial role in current and future environmental management. These environmental policy documents should not only show the directions for development but also be fully implemented, i.e. accompanied by implementing mechanisms, related organizational and financial means, concrete measures and actions for achieving the goals.

<u>Recommendation 1.1(a)</u>:
The implementation of the National Environmental Action Plan, the Environmental Strategy and other sectoral environmental strategies and plans neesd to be backed up by concrete programmes (including legislative, technical and organizational measures) with defined financing and clear institutional arrangements.

Recommendation 1.1(b):
The Ministry of Development and Planning should carry out the function of systematically following up on progress in implementing the plans related to MWEP in the "Government Action Plan 2000-2004". The function should form the practical framework for mobilizing the other Ministries and Directorates involved, ensure that action is taken, by the responsible agent, at the planned time, with the foreseen result, identify and assist in solving problems especially as regards a lack of inter-sector coordination. De facto progress should be reported periodically, to all stakeholders, highlighting problems, delays, and need for official and political action or decisions.

The Ministry of Waters and Environmental Protection was restructured, in 1999 and in 2001, to adapt to the major requirements of the new legislation. There is now a Secretary of State for European Integration with units for programmes and project management, for policy and legislative approximation, and for coordination of ISPA. A waste and hazardous chemicals management division was also set up. Despite these improvements the structure still needs institutional strengthening. The capacities in air protection within the Ministry in particular are not sufficient, bearing in mind future responsibilities with the preparation and the adoption of legislation in this area.

The National Research-Development Institute for Environmental Protection (ICIM), although not directly financed from the budget, has the major task of supporting the MWEP in the preparation of environmental policy and environmental legislation as well as in developing the national environmental monitoring and laboratory control. Today, ICIM to all extents and purposes plays the role of a national executive body for environmental protection. While possibly continuing to work on a contract basis for all issues regarding research and environmental engineering, part of ICIM and its staff should work on a State budget line for all issues regarding policy, legislation and monitoring. The understanding of the European Environment Agency (EEA), of which Romania has just become a member (early 2001), is that monitoring functions should be borne by a national body, budgeted by the State, which will guarantee the objectivity of the results and the continuity of the programmes.

Recommendation 1.2:
To improve its current structure, the Ministry of Waters and Environmental Protection should:

- *create a specific unit for air protection to promote policies and strategies, including programmes for implementation, on air protection.*
- *designate ICIM as the executive agency for the environment, taking into account that Romania is now a member of the European Environment Agency.*

The Ministry of Waters and Environmental Protection together with the local Environmental Protection Inspectorates have the major responsibility for environmental management. Nevertheless, there are many other ministries and institutions which share their arrangements and competencies, especially in air protection, water management and environmental monitoring. In spite of the recent establishment of sectoral working groups within the framework of the EU approximation process, the coordination between institutions is still weak. It should be improved by: (i) avoiding duplication and better organizing the control over the environmental media, e.g. water management and (ii) clearly determining the tasks of the institutions in environmental protection according their specific functions (e.g. monitoring).

Recommendation 1.3:
The Inter-ministerial Committee for Implementation of the NEAP and the National Commission on Sustainable Development should strengthen their collaboration; the NEAP should be used as a guiding plan for determining the responsibilities and the role of all institutions concerned and defining the deadlines for the measures to be taken.

As far as monitoring is concerned, coordination between the different governmental bodies is not always effective. For historical reasons, for instance, the Ministry of Health produces its own measurements and specific figures on air pollution and more generally on all health-related topics, such as tap water quality or water pollution of agricultural origin. MWEP and its institutes also produce data on the same issues without coordination on the methodological questions with the Ministry of Health. Therefore, there is a lack of consistency between the different sets of environmental data. The validation of data quality

is under the local EPIs' responsibility, but some subjects are still covered by specialized institutes and bodies, which do not report to the central and local environment administrations.

Recommendation 1.4:
A clarification of the public and private environmental monitoring network is essential. The connection between the central administration and the research institutes, currently under a self-financing status, should also be formalized with regard to public data production. The participation of the Ministry of Health and the Family should be reinforced, probably through a legal obligation to cooperate with the Ministry of Waters and Environmental Protection for the tasks prior to data production. (See also Recommendations 6.3, 7.5, 9.2, 14.2).

The national environmental impact assessment system has been in place since 1995. Romania ratified the UNECE Espoo Convention in 2001. EIA plays an important role as a preventive instrument. Romania's EIA legislation is quite complete and although not fully compliant it follows some of the main provisions of the respective EU legislation, in particular for the scoping phase and public participation. However, there are certain elements of the process that create difficulties and uncertainties in the implementation:

- the categories of activities requiring an environmental impact assessment (Annex II) is too broad and would apply to most activities. Therefore, clearer and more motivated selection criteria are needed;
- the decision-making process is not transparent enough, in particular as to how public opinion should be taken into account in the final decision, what is the mechanism for preparing and negotiating the draft environmental agreement and how can NGOs take part in the decision-making process.

Recommendation 1.5:
The Ministry of Waters and Environmental Protection should review carefully the environmental impact assessment process as far as the implementation of the procedures is concerned, in order to determine effectiveness and to identify areas where improvement is needed.

Since Ministerial Order No. 184/1997 for the approval of the environmental audit has been adopted, clear requirements exist on how the environmental audit should be carried out. It also stipulates how liabilities for past environmental damage should be identified in case of privatization. As explained above for the EIA procedure, there are discrepancies in the implementation of the regulations. In the permit issuing process ("authorization"), there is the possibility of discretionary interpretation by the competent authority in determining whether the company is in compliance. Another drawback for the good practice in environmental licensing is the lack of finance for properly carrying out the audits, especially before privatization. Moreover, the reliable implementation tools such as compliance programmes and self-monitoring plans are not presented or reviewed in most cases.

Recommendation 1.6:
The Ministry of Waters and Environmental Protection should include in the environmental audit the compliance programmes of the enterprises, approved by them as part of their overall investment programmes to make the operation of the industrial facilities comply with environmental legislation and standards. Special attention should be given to the preparation and implementation of self-monitoring plans as a basis for effective monitoring and control.

Enforcement of environmental legislation is obtained through various pressures: regular and random site inspections carried out by the local Environmental Protection Inspectorates, monitoring and control, imposing of sanctions such as fines and penalties. Because of a lack of investments, companies still prefer to pay sanctions instead of investing money in the renovation and improvement of technologies and cleaning facilities. Long-lasting non-compliance may result in court action. The size of the fines is fixed in the legislation, but it is often appealed. In most cases, the courts do not react adequately as they have no clear understanding of environmental legislation and practices. The case of Ireland, where specialized courts for environmental licensing have been established in order to make the enforcement process more efficient, is an example that should be pointed out.

Chapter 2

SPATIAL PLANNING

2.1 The framework for territorial development

Human settlements network

In 1999, the human settlements network included 2,951 territorial-administrative units: 263 urban and 2,688 rural communes. The urban communes comprise the capital, Bucharest (2 million inhabitants), 7 big cities (Timisoara, Cluj-Napoca, Iasi, Brasov, Craiova, Galati and Constanta) with about 300,000-400,000 inhabitants, 76 smaller cities with fewer than 300,000 inhabitants and 179 towns with fewer than 100,000 inhabitants. Urban communes are spread in a relatively balanced way throughout Romania, influenced by historical, geographical, economic and social factors. The process of urbanization, stimulated by the intensive industrial development of certain areas, caused an increase in population, an improvement in the socio-economic development of the towns, as well as the development of their surrounding areas.

Rural human settlements appear as a continuous network. Except for the alpine areas located at an altitude of over 1,200 metres, all zones are inhabited. The present situation of the rural settlements is characterized by the existence of a large number of villages (about 13,000), most of them small (44% fewer than 500 inhabitants). Rural communes are predominantly compact and linear settlements. Their municipal infrastructure is insufficient and they lack community services. Their main function is agricultural. Between 5 and 10% of the villages have a mixed industrial and agricultural function (for instance, they are either industrial, mining or manufacturing centres or villages located on the outskirts of large cities where important industrial estates have been built), or function as spas.

Housing stock and access to utilities

During 1991-1998, the dwelling stock grew by 2.7% (from 7.66 to 7.86 million dwellings) and the population declined, yet the number of dwellings and rooms remained insufficient. Approximately 20% of Romanians continue to live in overcrowded conditions. In the 1990s, dwelling construction was slow and uncertain. Beginning in 1993, urban areas ceased to attract the bulk of new construction work. In 1998, as a result of the drop in public funds as the main source for urban construction, private funds became dominant in the sector (84.7%) and, therefore, two thirds of newly built dwellings were concentrated in rural areas. Recent constructions reflect an essentially modified living style - small buildings accommodating a reduced number of families. In 1997, only 17% of the newly built constructions had more than one floor (compared to 75% in 1991). The new dwellings offer a slight improvement in the level of comfort, as they are more spacious.

However, the access to utilities in recent dwellings (water supply, sewerage system, central heating) is still relatively low. Thus, only 48.5% of dwellings have access to private or public water supply, 48.5% to sewerage, 44.7% are provided with indoor bathrooms and 33.9% with central heating. This is due to the fact that most dwellings are built in rural areas with the population's own funds. Access to utilities depends on financial resources, region and residential area (urban/rural). The overall quality of the dwelling stock, particularly of flats, requires additional refurbishment and repair funds, as over 2.5 million flats require improvement in thermal insulation, heating and sanitation and over 400,000 dwellings that were affected by earthquakes need to undergo structural consolidation work.

Territorial organization

The existing 41 counties have generally been constituted according to geographical conditions and are based upon the traditional relations of economic, social, cultural, ethnic, commercial and administrative cooperation among their human settlements. The counties have an average surface of about 6,000 km^2 and an average population of about 500,000. They are composed of the administrative territories of the villages and towns.

The towns are basic urban administrative units. Towns with a large number of inhabitants and great economic, socio-political, cultural and scientific importance have the status of municipality. According to Law No. 69/1991, the public administration of the administrative units is based upon the principle of local autonomy, decentralization of public services, elected local administrative authorities and consultation of the citizens on problems of special local interest. The public administrative authorities responsible for the local autonomy in villages and in towns are the local councils, as deliberative authorities, and the mayors, who have executive power. The local councils work under a four-year mandate and are composed of councillors elected according to the provisions of the law.

Each county has an elected county council that coordinates the activity of the local councils. The Government appoints a prefect for each county and for the municipality of Bucharest. The prefect is the representative of the Government and supervises the public services provided by the ministries and by other local authorities, subordinated to the central administration but constituting the administrative units.

The highest level in Romania's constitution is the national level. This level controls public administration and implements domestic and foreign policy. It directs and supervises the activities of ministries and other organs of the central and local administration and ensures that the administration complies with the law. The responsibility for spatial planning falls under the General Directorate for territorial and urban planning of the Ministry of Public Works, Transport and Housing.

Land administration and land restitution

Before 1989, Romania was under a Communist regime and land was State property. Land restitution was initiated in 1991. The land restitution process affected about 9.4 million ha, i.e. 39% of the total area of Romania. By April 1999, about 7.7 million ha had been returned. The total number of land claimants was about 4.7 million, or 41% of the rural population. About 3.7 million claimants have already received their property titles, i.e. the certificates that confirm the transfer of land into private ownership. The property title is a real property right. The owner enjoys all the rights of Romania's legislation like public security and full property rights. Apart from agricultural land, small and medium-sized industries, big industries, service companies (like banks), transport systems and, most importantly, dwellings have been privatized. In 1998, 95% of Romanian dwellings were privately owned.

In 1996, by approval of Law No. 7/1996, a modern general cadastre was set up. So far it has been very inefficient. Today, the cadastre lacks adequate staff and financial and technical resources, which slows down land registration and accurate geodetic surveying. As the restituted land involves ownership that dates back 50 years, many of the claimants are senior and urbanized and do not have an agricultural background. They therefore have little ability or interest in cultivating the land that is returned to them (see Chapter 11). In addition, the agricultural income tax for holders of property titles to arable land was suspended from 1996 until 2000, dispelling any incentive to sell land for commercial agricultural exploitation.

In order for Romania to accede to the European Union by 2007, the EU has obliged the Government to finalize all spatial plans (county plans and general urban plans). To meet this objective, it is first necessary to finalize the land restitution process and have all cadastral information adequately systemized and operational. The Ministry of Agriculture, Food and Forests and the Ministry of Public Works, Transport and Housing are working with the cadastre and the land restitution organizations to this end. Centrally, the cadastre consists of the National Office of Cadastre, Geodesy and Cartography (NOCGC), which is subordinated to the Government and acts under the general supervision of the Prime Minister's Office. Under the NOCGC are 42 county offices. Fiscal, economic and legal assistance is provided at State level by the Ministries of Justice and of Finance and at regional level by the Land Book Offices and the Public Finance Boards. The local commissions in all Romanian municipalities implement the land restitution process. These commissions are entitled to deliver property titles. District commissions have been set up to validate the decisions of the local commissions and to solve any appeals by (potential) owners.

2.2 Spatial planning policies and strategies

Historical background

The legacy of the central-planned system of economic and territorial development was poor in terms of sustainability. Initiated projects were

based on quantity rather than quality and priorities lay with agriculture and industry rather than infrastructure or housing. In 1991, a new system of spatial planning was adopted based on the French planning system. The work programme for 1997-2000 of the then Ministry of Public Works and Territorial Planning focused on aligning spatial planning and land use with the EU directives and norms, and included the following objectives;

- Drawing up the spatial plan for territorial management;
- Drawing up general urban plans throughout Romania;
- Constructing quality housing;
- Stabilizing the quality of life in rural settlements;
- Reducing the number of seismic-sensitive houses;
- Introducing a modern cadastre;
- Upgrading the infrastructure between rural settlements;
- Setting and enforcing construction rules;
- Developing activities regarding EU integration and cooperation with foreign ministries of territorial planning.

The Spatial Plan for Territorial Management (PATN) is a set of synthetic studies and plans which formulate strategies, forecasts and measures determining the dimension, the direction and the priorities of the development occurring on Romania's territory, in accordance with regional and continental requirements. The PATN is based on three principles: (a) a balanced socio-economic development of all areas of Romania; (b) the State responsibility for natural and built heritage; (c) a rational use of the national territory. So far, three so-called sections (or in legal terms "laws") have been finalized and approved by Parliament. These are the Law on Infrastructure of National Relevance (No. 71/1996), the Law on Water Resources (No. 171/1997) and the Law on Protected Areas of National Interest (No. 5/2000). Near to approval are section 4: Network of Communes and section 5: Natural Risk Areas. In the future, sections regarding tourism, agriculture, energy transport networks and forests will be drawn up.

Section 1 of the PATN covers existing and future infrastructures of national relevance, i.e. all motorways, express railroads, canal and river transport and airports. The future transport system will meet all relevant national and international minimum requirements and standards. For example, three major trans-European transport routes, which are necessary in the light of accession to the EU, are included. This section was compiled in close collaboration with the then separate Ministry of Transport.

Section 2 of the PATN covers infrastructures for water resources management. Extensive studies have clarified the current situation of water resources in Romania and the minimum requirements for connection to the water supply and sewer system for households and industry. Per county, lists show which technical efforts are necessary in the short term (-2005), medium term (-2015) and long term (-2025). Secondly, this section lists all the country's polluted waters (due to industry) which need cleaning up. Finally, a list shows the existing use and future need of water for agricultural irrigation. This section is compiled in collaboration with, among others, the Ministry of Waters and Environmental Protection, as this Ministry is responsible for the implementation of the Water Law.

Section 3 of the PATN describes the protected natural and built areas of national interest. The natural areas include biosphere reservations and national parks, reservations and natural monuments, areas with valuable natural resources and prevalently agricultural areas. The protection of natural areas (biospheres, parks and reserves) is the responsibility of the Ministry of Waters and Environmental Protection. The protection of both natural and built monuments is the responsibility of the Ministry of Public Works, Transport and Housing. The built heritage is divided into architectural monuments, archaeological sites and clustered monuments like town centres.

The Law on Protected Areas aims to protect areas by zoning them and describes what is and what is not allowed within these zones. The Ministry of Public Works, Transport and Housing is involved when functions within a zone have to be or are changed. When modifications are necessary (for any reason) within a zone, leading to possible alterations of the environmental quality of the site, then the Ministry of Waters and Environmental Protection (for natural areas) is involved. Other responsibilities, like improvements or modifications of natural objects, lie with the Ministry of Waters and Environmental Protection for natural protected areas and the Ministry of Culture and Religious Affairs for protected built-up areas.

Section 4, on the network of communes, hierarchically divides urban areas in different categories to distinguish them socially, economically, culturally, etc. The draft section has been approved by the ministries and awaits approval from Parliament.

Section 5, natural risk areas, sets out measures to minimize disasters due to earthquakes, floods and landslides. This draft has recently been finalized and submitted for approval to the relevant ministries.

Related national policies

The Government of Romania has initiated a number of national plans and programmes that relate to the national planning activities. The National Strategy on Sustainable Development shapes the framework for spatial and economic development. Strategic objectives with relevance to territorial planning included in the National Strategy on Sustainable Development are:

- preventing the degradation of the natural heritage and establishing efficient ways of using land in accordance with the requirements of economic development and environmental protection (zoning industrial areas separately from urban settlements for example);
- balancing the relative development of regions and reducing disparities between them;
- improving living conditions, urban transport and the protection of the natural and built heritage;
- developing urban settlements in zones which are not subject to natural risks and pollution.

Current and future legislative and policy developments concerning territorial planning take account of other plans and strategies, such as the National Strategy and National Action Plan for Biological Diversity Conservation and Sustainable Use of its Components, the Pan-European Biological and Landscape Diversity Strategy, the National Water Management Strategy and Forestry Development Strategy and the National Strategic Action Plan for the Black Sea. In particular, the Ministry of Public Works, Transport and Housing has an important role in the implementation of the programmes derived from the Environmental Protection Strategy with its related National Environmental Action Plan, as it affects diverse rural areas and urban settlements. The Ministry of Public Works, Transport and Housing is a member of the Inter-ministerial Committee for the NEAP, which coordinates intersectoral policies and actions.

Related international policies and programmes

In addition, Romania has initiated and participates in a number of international plans and programmes closely related to spatial issues. The most important projects include: (a) the development of the Trans-European Highway; (b) Interreg I (EU initiative, 1990-1993) to integrate internal border areas into a single internal market and reduce the isolation of external border areas; (c) Interreg IIc – CADSES (Operational Programme for the Central, Adriatic and South-Eastern European Space) (EU, 1994-1999) regarding transnational cooperation on regional and spatial planning, including the management of water resources; (d) Interreg III (EU, 2000-2006) to strengthen economic and social cohesion in the EU by promoting cross-border, transnational and interregional cooperation and the balanced development of the EU territory; (e) transnational cooperation in zones throughout central and south-east Europe (Black Sea region and CADSES region); (f) Vision Planet, aimed at the joint development of a transnational spatial development perspective for the Black Sea region (including the Danube Delta), the Carpathian region and the Danube River region.

Spatial planning in the EU integration context

In 2000, Romania submitted its Medium-term Economic Strategy to the European Commission. The document contains a paragraph on territorial planning and regional development that takes over the main directions already set out in the Sustainable Development Strategy and adds elements necessary to the EU integration process. Major importance is given to the Spatial Plan for Territorial Management (PATN), observing the principles of sustainable development, as well as to EU standards. The document summarizes the strategic objectives for regional development, which at national level are: (a) promoting market economy mechanisms in all regions to improve competitiveness and achieve economic growth; (b) promoting a harmonious development of a territorial and communes network; (c) increasing the regions' capacity to support their own development (in terms of financing institution-building and decision-making); (d) promoting the principles of sustainable development; and (e) providing equal opportunities

in terms of access to information, technological research and development, continuous education and training. At regional level the principles include: (a) reducing disparities between regions, counties, urban and rural areas, central and suburban areas, etc.; (b) preventing the emergence of problem areas; (c) harmonizing regional development initiatives with national priorities and EU orientations; and (d) promoting policies adjusted to regional features (mono-functional areas, especially agriculture and mining, large urban centres, protected natural and housing areas, border areas, areas with environmental problems).

Romania is eligible for three EU support funds, which share spatial planning objectives and principles. These funds are PHARE, SAPARD and ISPA. Under the SAPARD programme for agricultural and rural development, applicant countries are required to draw up seven-year rural development plans for appropriate areas. For this reason, the National Council and Agency for Regional Development has been set up in compliance with the Law on Rural Development. Some of the projects supported by SAPARD are: (a) the renovation and development of villages; (b) land improvements (irrigation included); (c) the classification of land lots; (d) the development and improvement of rural infrastructure; and (e) forest activities. In 1999, Romania received over € 150 million for SAPARD projects from the EU. ISPA will provide support for environmental infrastructures, such as drinking-water supply, water treatment, solid waste management, air pollution abatement, and for transport infrastructures, such as encouraging sustainable transport of passengers and goods and expansion of the Trans-European Network for Transport (TEN-T). Initially, this financial support is granted for the 2000-2006 period.

2.3 Related legislation, institutions and the planning system

Legislation

The *Law on the Authorization of the Construction of Buildings and some Measures for Housing Construction* (No. 50/1991) is the most important law for spatial planning. It is the legal framework for building and altering constructions and infrastructures, and arranging the urban and regional planning process. Building permits are issued by the local administration, in accordance with the urban and regional planning documents. An urban certificate issued by the urban or regional planning authorities accompanies the permit. The urban certificate specifies the legal, economic and technical characteristics of the land and buildings. A construction project should be agreed with the Ministry of Waters, and Environmental Protection if it is subject to an environmental impact assessment and with the Ministry of Culture if construction activities are undertaken in protected built areas (See Chapter 1). Urban certificates are made public after being granted. There are no special provisions for public information or participation during the licensing procedure.

With the Law on the Authorization of the Construction of Buildings and some Measures for Housing Construction (No. 50/1991) came Ministerial Order No. 91/1991, which stipulates the procedures for authorizing and the contents of the planning documents. In 1996, the former Ministry of Public Works and Territorial Planning introduced the Programme for Housing Construction whereby buildings and houses were constructed with mortgage possibilities and extra comfort (water, sewage, heating) for the social sector (rental). This programme also included the finalization of buildings that were planned or under construction before 1990. So far, US$ 300 million have been invested through this programme.

The legal framework for land restitution and land administration was established by a number of laws. The most important is the Law on Agricultural Land Resources *(Legea Fondului Funciar) (*No. 18/ 1991), or so-called *Land Restitution Law*, which establishes the constitution and reconstitution of property rights on the land of the former agricultural cooperatives. Law No. 7/1996 on Cadastre and Real-estate Publicity provides the legal framework to organize and manage a modern cadastre, including facilitating land restitution. The Law of Restitution (No. 112/1996) established the restitution of dwellings to their former private owners. The Leasing Law (No. 36/1997) arranges the leasing of land, Law No. 54/1998 governs the legal transfer of land and Law No. 213/1998 establishes the legal status of public property. The Land Law (No. 1/2000) offers legal rights to former farmers to claim larger areas of farmland and forest land than provided for in the Law on Agricultural Land Resources. The latter established the right to claim 10 ha of farmland and 1 ha of forest per family, while the Land Law provides former farmers with the opportunity to reclaim 50 ha of farmland and 10 ha of forest. Only the claims of farmers who can prove that they had more than the initial 10 ha of

farmland are approved. So far, the implementation of the laws on land restitution has been hampered by a limited technical and financial capacity and lack of staff.

The *Law on Regional Development* (No. 151/1998) establishes the institutional framework, objectives, competences and instruments specific to regional development in Romania. The main objectives of this Law are to: (a) lessen regional imbalances and prevent new imbalances; (b) prepare the institutional framework to meet the criteria of integration with the EU; (c) prepare access to the structural funds; (d) stimulate local/regional initiatives and make use of local/regional resources; (e) stimulate internal and international cooperation on a interregional level. Regional development councils and agencies were set up at central and regional level. The councils coordinate and promote regional development activities, whereas the agencies are the executing bodies. The financial instruments for regional development are coordinated through the National Regional Development Fund, which is financed by the EU, the Romanian Government, and international organizations and banks.

Institutions

Core responsibility for spatial planning lies with the General Directorate for Territorial and Urban Planning of the Ministry of Public Works, Transport and Housing. In the counties, territorial planning departments are run by the organizers and coordinators, and in the municipalities, by the chief architect's office. The Ministry prepares draft laws, draft governmental resolutions and other legal acts on territorial planning. It also provides substantive input for the preparation of legal acts by other ministries and governmental institutions, and regional and local authorities. The Ministry prepares and approves the norms, standards and regulations in territorial planning and supervises territorial planning at the regional (county) level. Nationwide, territorial planning, public works and housing construction are supervised by the Ministry's State Inspectorate. Subordinate to the State Inspectorate are 42 county inspectorates for public works, territorial planning and construction. In addition, the Ministry is responsible for the Institute for Statistics on Construction and Information on Territorial Planning (INSEROM).

The Directorate for Territorial Planning works closely with the National Institute for Urban and Regional Planning (UrbanProject). This body operates independently, but receives most of its projects and finances from the Ministry of Public Works, Transport and Housing. The activities of UrbanProject include: (a) fundamental and applied research in urban and regional planning; (b) technical assistance and consulting; (c) scientific and methodological services; (d) quality certification for urban and regional spatial plans; (e) transfer of know-how; and (f) publications. UrbanProject employs approximately 70 people, which is twice as many as the Directorate for Territorial Planning. This means that UrbanProject executes most of the tasks legally assigned to the Territorial Planning Directorate.

The responsibilities of the Ministry of Waters and Environmental Protection regarding spatial planning focus on (a) authorizing and amending territorial plans with respect to environmental protection; (b) coordinating EPIs in the authorization of territorial plans; (c) initiating and licensing common projects with the Ministry of Public Works, Transport and Housing; (d) implementing the territorial planning and environmental protection regulations in the regional and local planning departments. In addition, the General Directorate for Water Management and the Ministry of Agriculture, Food and Forestry, the Ministry of Industry and Mineral Resources and the Ministry for National Defence are also involved in territorial planning.

The planning system

The planning system aims to:

- achieve balanced socio-economic development;
- improve the quality of life;
- ensure competent management of the natural resources and the protection of the environment;
- ensure the rational utilization of land.

Within the spatial planning system, there are two levels of planning: the regional (or county) level and the local (or urban) level. The regional plans can be divided into: (a) the spatial plan for the national territory (see above); (b) regional planning studies; (c) planning studies for counties and for the municipality of Bucharest; (d) planning studies for a group of cities or a group of villages; (e) planning studies for a single city or a single village. At the urban level, three different plans exist: (a) the general urban plan covering a municipality, city, health resort or village; (b) the zonal urban plan

including a central urban area, functional zone, protected area or leisure settlement; (c) the detailed urban plan which plans the major investments. During the planning process, the authorities have to take into account the general and local urban regulations. Planning processes can be initiated by the central administration of the planning area, county councils and local councils. Currently, nearly 90% of the Romanian territory is covered by regional and urban plans. At county level, some initiatives have been taken to update those regional plans that have covered a long period of time (over 5 to 10 years).

Regional plans have to include studies on: (a) agriculture, forestry, tourism and other economic activities; (b) water management; (c) traffic and transport; (d) population, employment, demographic mobility; (e) environmental rehabilitation, protection and preservation; (f) ecological studies; (g) housing and quality of life. Further, the planners have to consult and/or submit their projects to a large number of institutions and organizations, governmental and private as well as the population (i.e. public participation) (See Chapter 4).

The urban plans have to take into account: (a) the historic-cultural, ethnographic, urban and architectural evolution of the commune; (b) traffic and transport development; (c) geotechnical and hydrotechnical conditions; (d) the physical assessment of the housing stock; (e) environmental rehabilitation, protection and preservation; (f) protected areas of outstanding value; (g) real property analyses; (h) public institutions and services; (i) urban utilities; (j) other specific studies. As far as consultation and references are concerned, the urban planners have virtually the same responsibilities as the regional planners. At both planning levels, however, no approval is necessary from a body higher than that of the administrative initiators of the particular plan. The references that are required from the higher level act as such.

An important element of the planning system is the provision for public participation in the territorial planning decision-making process. All territorial planning documents must be submitted for public discussion. The body that organizes the planning procedures arranges this discussion. All natural and legal persons and public organizations concerned with planning are entitled to submit their proposals for planning solutions, while the property owners, tenants, other interested natural and legal persons located in the territory affected by the planning have the right to lodge complaints. The public is informed when the council has decided that a planning process will be initiated. The consultation of the public is then possible after the (draft) plans have been drawn up. The accepted proposals of the public will be included in the plan before it is submitted to the appointed institutions and organizations for approval.

Annex II to the Law on Environmental Protection (No. 137/1995) obliges regional and urban planners to submit an environmental impact assessment as part of the planning procedure. Ministerial Order No. 125/1996, on the licensing of economic and social activities with an environmental impact according to environmental law, added a compulsory environmental permit to the planning process. Due to the complexity of these additional environmental obligations, Law 214/RT/16/NN of 1999 abolished this requirement and replaced it with the obligation to have an environmental chapter in all new territorial plans. This environmental chapter includes: (a) the planning area's current status, problems and priorities; (b) proposals and regulations for the planning area; (c) maps of the planning area covering specific zones, the vicinity of polluted areas, relations with natural and built-up risk areas; (d) the need for the approval of central and local authorities in accordance with relevant international environmental charters, strategies and regulations adopted by the Romanian Parliament (for example, with regard to biodiversity, climate change, habitat II, landscape conservation, etc.). The chapter does not prescribe measures and thus does not contain binding elements. It is not so strong as an EIA. The procedure of adding an environmental chapter to spatial planning is common in the Netherlands and other EU countries.

According to the Law on Environmental Protection (No. 137/1995) and Ministerial Order No. 125/1996 describing the procedures for permits and environmental impact assessments, urban plans are subject to an environmental permit issued by the Division of Permitting and Certification. From 2001, the Ministry of Waters and Environmental Protection will reinforce this permit for urban plans in municipalities with over 100,000 inhabitants.

2.4 Conclusions and recommendations

Regulatory instruments are strongly integrated into the Romanian spatial planning system. All decisions by Government and Parliament are converted into legislation. Over the past 10 years, many new regulations have been introduced. In the 1997-2000 period, for example, 11 laws, 13 orders and 66 decisions have been added to the existing planning legislation. The consequences of this legislative practice are a high number of separate pieces of legislation, a high level of complexity making it difficult to understand them individually and in their global context, and a low level of transparency. At the local level, implementing this legislation and understanding its links with other sectoral legislation create problems. In addition, this complexity and opacity undermine public participation in decision-making.

Recommendation 2.1:
The Romanian Government should draw up a legislative framework for spatial planning that integrates and reconciles all fragmented planning legislation.

The Spatial Plan for the National Territory (*Planul de Amenajare a Teritoriului National* – or PATN) is the key regulatory instrument of the Ministry of Public Works, Transport and Housing. It formulates strategies, forecasts and measures determining the scale, the direction and the priorities of the development occurring in Romania, in accordance with internationally recognised sustainability requirements, as well as EU standards. Through approval by Parliament, the individual sections of the PATN become laws and thus, as a logical further step, demand implementation. The process of implementation is a major task. The current situation is far removed from the vision of the PATN. It requires a full understanding of the capabilities and constraints for implementation and demands serious but necessary efforts.

Recommendation 2.2:
The Ministry of Public Works, Transport and Housing, in cooperation with relevant ministries and regional and local authorities, should make a greater effort to implement the Spatial Plan for Territorial Management (PATN). The development of a structured plan, allocating responsibilities to all authorities, should form the basis of the implementation of the PATN. Furthermore, this implementation plan should contain realistic and achievable goals, taking the current financial and technical constraints into consideration.

The creation of a central and modern cadastre was initiated in 1996 with the approval of the Law on Cadastre and Real Estate Publicity. From that moment on, efforts were made to set up a central register of real property in relation to owner, situation, use and value. The creation of the registration data bank, however, has been slowed down due to technical, financial and methodological reasons. The effects of these constraints are wide-ranging. First, with regard to spatial planning, the second generation of regional and urban plans cannot be started before land restitution is finalized. Land restitution, on the other hand, can only be finalized when cadastre registration is fully and adequately operational. Second, in theory, effective property titles can be granted to owners only when their properties are registered at the cadastre. Third, a land market system can operate effectively only when land administration systems are in place. And fourth, environmental enforcement instruments (for example, the polluter pays principle) can be applied only when the registration of landownership, land use and land value has taken place.

Recommendation 2.3:
To minimize the constraints on the renewal of spatial and environmental legislation and the workings of the land market, the Ministry of Agriculture, Food and Forests should give a higher priority to the registration of ownership, situation, use and valuation of land by improving the technical, financial and managerial capacity of the cadastre.

The sectors of spatial planning and environmental protection should strengthen their cooperation. Policies in both sectors could be more focused and adjusted in order to ensure a more efficient implementation. Spatial developments, such as highways, industrial areas and towns, will always have environmental consequences and environmental management, like national parks and related zoning, will always have an impact on spatial developments. Current administrative activities are strictly limited to the implementation of the legal requirements of the various planning and environmental laws. These obligations were respectively prescribed by the Law on Environmental Protection (No. 137/1995) and the law which required environmental chapters in territorial plans. Both policy fields can however benefit from collaboration in conceptual, instrumental and organizational activities.

Recommendation 2.4:
Under the direction of the Ministry of Development and Planning, inter-ministerial cooperation and coordination between spatial planning and environmental protection should be improved in the administration of the design and protection of physical features (public infrastructures, land use including protected areas) and human habitat.

With the collapse of communism came the deterioration in living conditions and services in the rural areas. During the past few years, the disparities between rural and urban areas have only increased since the market economy predominantly focuses on areas with high levels of resources. These resources are naturally more available in urban areas. This has led younger people to move to urban zones, leaving rural areas with a relatively aged population with lower life expectancy. However, at central level, these problems had been anticipated at an early stage by paying more attention to development in rural areas. Special efforts have been made to set up central administrative organizations that predominantly focus on regional development. They are responsible for the collection of financial and technical means in order to favour development initiatives. These organizations draw up plans and programmes for regional development and rational investments in rural areas. In order to ensure balanced development, however, it is important to decentralize the development initiatives. Decentralization would make it easier to achieve initiatives and make them more effective and efficient, helping to find better solutions for specific problems in given areas. Decentralization, naturally, necessitates adequate vertical steering and communication as concerns the implementation of plans and programmes and the supply of information and means.

At present, the regional and local levels are facing major problems with the implementation of rural and regional development projects. These problems are, in particular, due to inadequate vertical communication (top-down) about the opportunities and constraints of financial and technical means for rural development plans and programmes. The central level often does not pay enough consideration to regional and local requests for financial and technical assistance for projects. There is apparently no clear procedure for addressing this kind of requests. However, the financial and technical means to meet these local requests are always to be channelled through the central level structures. As a consequence, many regional and local organizations try to become independent from these centralised structures and have set up their own departments or other structures that strive to obtain themselves the requisite means for developing their local projects.

Recommendation 2.5:
Decisions about programmes and projects should be taken jointly by the national, regional and local levels through a consultative process. All three administrative levels should participate in regional development initiatives; the central level should stimulate, coordinate and facilitate initiatives; the regional level should operationalize, implement and control plans and programmes; and the local level, implement and execute the individual projects.

Chapter 3

ECONOMIC INSTRUMENTS AND PRIVATIZATION – THEIR IMPACT ON ENVIRONMENTAL PROTECTION

3.1 Economic instruments and their impact on environmental protection

Macroeconomic background and indicators

The change from a central economy in 1989 presented a dual problem and challenge for Romania: the urgent need for economic recovery and, at the same time, the structural change from a State-controlled economy to a market-based economy. An important element was the privatizing of State-owned enterprises, making them independent commercial companies. This process, which demanded the restructuring of existing production methods and technology, of financing, organization and markets, led to a decline in industrial and agricultural output. Moreover, the privatization of some state-owned industrial enterprises was apparently not for the purpose of continuing production, but rather of taking over a potential competitor or simply acquiring the relatively cheap land of the firm. Furthermore, there was – and to some extent there still is – a certain resistance from the unions and the public, because of increasing unemployment and negative social effects. As part of the transition the Government also started designing and implementing new economic instruments, but due to the persistently serious economic situation, the ability of these instruments to manage the change in economic policy still seems limited. Therefore, when evaluating the status and impact of Romania's economic instruments today, the economic conditions and developments over the past decade need to be taken into account. The macroeconomic indicators in Table I.3 clearly illustrate a decade of turbulent economic development, with a second severe economic depression in 1997-1998 and comparatively less progress towards creating the conditions for a market economy.

Status of economic instruments for environmental policy

Air protection

There are at present no charges or fees for air emissions. The main air polluter in Romania is the energy production sector. Nor are there any tax benefits for energy-related investments impacting on air emissions.

Environmental Protection Inspectorates impose fines and penalties for non-compliance with air emission limits, on a case by case basis. The fines are relatively low, ranging from US$ 10 to 40 per incident, and so do not act as a deterrent.

A tax differentiation for leaded and unleaded petrol was introduced in 1994 in order to encourage the use of unleaded petrol. At present, unleaded petrol is only slightly cheaper -- US$ 0.04 per litre -- than leaded petrol of the same octane grade.

Individuals, State and private companies pay a special tax on all private vehicles and on lorries, tractors, agricultural machinery and water transport vehicles. The tax depends on the engine capacity and varies between US$ 2 and 7 per year. The tax was introduced to increase the revenue of local governments for building and maintaining public roads.

Other taxes on the retail price of petrol and the sale of cars are discussed in Chapter 12.

Since the beginning of 1998, import duties on cars equipped with catalytic converters have been lower than on cars without catalysers. Customs taxes and duties on imported cars amount to about 20% of the retail price. Imports of cars over eight years old are not allowed.

There are no environment-related taxes on air travel. However, Urgent Ordinance No. 29/1997 empowers the Ministry of Public Works, Transport and Housing to issue special regulations for environmental protection.

Water protection

The end-user charge for the water supply is made up of:

- a *water extraction charge* levied on the quantity of raw water extracted from rivers, including water from the Danube, lakes and groundwater;
- a *water discharge fee* for waste water discharged into water bodies; and
- a *water consumption charge* to cover the operating costs of the water supply companies.

The water extraction charge is uniform throughout the country, but varies according to the source and the use of the water. Box 3.1 gives an indication of price levels for water abstraction. The water abstraction charges cover all raw water abstracted and subsequently resold to the local water supply distributors.

The *water discharge fee* comprises two components: a *tariff* for *within-limits* discharge concentrations and a *penalty* for *excessive* discharge concentrations. The resulting *end-user prices* vary among the water supply companies depending on their raw water cost, discharge fees, the operating technology of the water supply facilities, the autonomy of the individual water companies and the need for special flood protection measures.

The raw-water prices that Apele Romane charges to the local supply companies is controlled by the Office of Competition; the end-user cost (including both raw price and local cost) is decided and approved by the Municipality, but with variations depending on how the local company is organized. All costs for extraction and delivery to local facilities, including flood protection for Apele Romane's delivery pipes, are borne by Apele Romane. From the point where the raw water is received, the local supply company is financially and operationally responsible for its own facility operation, management, maintenance, state of technology, new investments, and flood prevention measures.

At the end of 1997, some 80% of consumers paid between US$ 0.60/m^3 and US$ 0.75/m^3 of drinking water. Of the other 20%, some paid as little as US$ 0.15/m^3, others as much as US$ 4/m^3. In the average family budget, these water-supply expenses were said to represent 2.5-3% of household income. At present, some 50% of Romania's water consumption is metered; the rest is based on estimated consumption.

Sewage charges: The variation in sewage charges is very wide due to the variety of conditions existing throughout Romania. The level of the charges depends primarily on whether the locality has a waste-treatment plant or not, existing technology and operating set up, the discharge conditions and contents and the state of the sewage network. Charges for domestic waste water per cubic metre vary from US$ 0.20/m^3 to 0.35/m^3 depending on the location. In extreme cases the charge has been US$ 1.25 per m^3. According to Government Decision No. 47/2000 the charge comprises two components: a tariff for within-limits discharge concentrations and a penalty (over and above the tariff) for excessive discharge concentrations. At present there are twenty- seven parameters divided into five main categories: general chemical parameters, specific chemical parameters, toxic and very toxic chemical parameters, bacteriological parameters and physical parameters.

Box 3.1: Indicative prices for water abstraction in 2000

- Water abstracted from inland rivers:
  - For households, industry, and livestock: US$ 6.1/1000 m^3
  - For irrigation and fishery: US$ 0.5/1000 m^3
  - For power generation: US$ 0.04/1000 m^3
- Water abstracted from the Danube:
  - For households, industry, livestock and power generation: US$ 0.70/1000 m^3
  - For irrigation and fishery: US$ 0.5/1000 m^3
- Water abstracted from underground:
  - For households: US$ 3.0/1000 m^3
  - For industry: US$ 6.7/1000 m^3
  - For the irrigation and fishery: US$ 0.5/1000 m^3
  - For livestock: US$ 4.0/1000 m^3

Other instruments related to water quality: There is a water pollution non-compliance fee and there are also financial mechanisms for the completion, modernization and rehabilitation of water quality improvements (water supply, waste-water treatment plant, sewage systems and networks, etc.). These mechanisms include State subsidies, government-guaranteed loans and exemption from import duties on environment technology.

Waste collection and disposal

User charges on municipal waste: Three charging systems are applied:

- for households: a fee per household, based on family size;
- for industry and other waste producers: a fee per ton of waste generated.
- for disposal at public disposal sites and landfills: a charge per ton dumped.

Household waste is charged as a fee per person per month and generally varies between US$ 0.30 and 0.70, depending on the municipality. Disposal charges for industry generally range between US$ 8.5 and US$ 12.5 per ton depending on the site. Information on industrial waste charges and depositing on industry's own sites was not available.

It is not mandatory for households to participate in the waste collection system. In many smaller towns the waste collection and transport system has completely broken down since 1989. (for more details, see Chapter 8).

Charges on hazardous waste: There are no special charges for hazardous waste; the charge for 'normal' waste is applied. Usually the producers, i.e. industry, possess and manage their own landfills. The environmental situation of company-managed landfills and deposits is not known. Public landfills do not have special facilities for sorting and depositing hazardous waste.

Deposit refunds/Recycling: Until 1989, recycling was extensive, with approximately 11,000 recycling centres. Today only a few hundred remain, all operated by specific industries.

Waste non-compliance fees: There are at present no non-compliance fees or fines on hazardous or industrial waste, nor on illegal waste imports.

Natural resources: There are various fees for the use and exploitation of natural resources: for example, for land use, tree cutting, mining, oil exploitation, aqua and marine areas, and hunting. It is understood that the types and levels of these fees are negotiated case by case, depending on the actual sites, the extent and purpose of use, the extent of remedial obligations, etc. The fees involved are, therefore, not considered general 'economic instruments', but rather general fiscal income or rent. Details of the respective revenue from these individual activities are not available or reasonably verifiable.

A series of new instruments is being considered or planned by the Ministry of Waters and Environmental Protection, although not yet adopted. The instruments include a tax on the sulphur content of fuels, air emission charges on permitted emissions, flood protection fees and dam protection and enhancement fees, fertilizer and pesticide product charges, and product charges for different post-consumption waste products (e.g. packing materials, tires, batteries, newspapers). The Ministry is also exploring the introduction of emission trading and the trading of effluent discharge permits (which would enable industry and municipal sewage treatment plants to trade BOD, nitrogen and phosphate discharges). Also under consideration are an increase in effluent tariffs based on quantities and distinguishing among various types of suspended and discharged substances, the improvement of penalty systems to further discourage non-compliance, punitive measures for wilful violators, and the re-introduction of deposit-refund systems.

Environmental impact of the use of economic instruments

The use and effectiveness of economic instruments to address environmental problems seem limited in Romania, mainly because of:

- A perception (both by Ministries and by the public) that economic instruments are not viable under the present economic situation. Furthermore, they have a direct negative effect on the political will to set realistic charges and impose sanctions;
- A lack of or poor understanding of the links between policy instruments, environmental priorities and environmental investments. The links are not sufficiently visible to the public;

- A limited institutional capacity - beyond the strategy and policy deciding and creating levels - to design the detailed programmes and mechanisms for implementing the instruments. This also includes an inadequate capacity to assess the options available, and to identify the constraints on their implementation;
- Difficulties in determining the economic levels of charges, policy directions and environmental goals so as to ensure a sustainable use of natural resources;
- The vague relationship between the type of measure and the cost of remedying environmental damage and the choice of the most feasible instruments and level of charges.
- Poor monitoring capacity. Monitoring is more than 'data collection'. It is a question of 'managing the environment' by interpreting the data and adjusting the future directions of the impact of economic instruments.
- The clear dominance of revenue-raising considerations in the choice and design of the economic instruments. Having no or very little incentive impact, few of the instruments can be considered as policy-implementing tools - least of all for environment policy.
- Controversies regarding the use of revenues. This also influences cross-ministerial and sectoral cooperation.
- The general perception that fines and penalties are only for 'punitive purposes', and not to induce a change in behaviour through the threat of serious financial consequences or to enable justified compensation for damage.
- Many of these problems are linked to an apparent inability to explain overall environmental policy aims and contents to the general public and subsequently to explain the tools and methods for implementing the policies. Therefore, the public is unimpressed and unaware of the results, and merely considers most instruments as 'new Government taxes'. Social acceptance and understanding of environmental policy integration is limited.

The present very low water prices are no doubt the major reason for the extraordinary high consumption of water (492 l/cap/day in 1999) compared to other countries (see Table 7.8). Furthermore, this figure excludes losses in the external supply network (up to the consumer's connecting pipe) varying from 1.2% in Calarasi county to 42.2% in Constanta county, an average 24.2%. However, at an individual consumer level, the water wasted is considerable, due to the low quality of fittings in homes, irrational and excess use and the lack of individual metering. According to measurements made in Bucharest, Constanta, Brasov and other towns, the combined loss from both the external network and the indoor water wasted amounts to 50-60%.

Low water prices also mean that true cost recovery and financial sustainability are not achieved and also that the forecast of future water demands is based on excessive quantitative calculations, without considering economic factors. In addition to leading to overestimating the water supply systems and requirements, there are absolutely no incentives for consumers to reduce consumption, which would not only save natural resources but also significantly reduce operating costs. When considering the very high 'consumption per capita per day' throughout Romania, the reason is not just 'loss due to leakage from the water supply network', but also consumers' excessive use of water due to a low and unrealistic price.

Environmental expenditure and funding sources

Table 3.1 shows environmental protection investment and expenditure. The figures show that most of the expenditure has been in the waste-water sector (48% in 1998), followed by waste management (26%) and air (9%). Taking inflation into account, total expenditure increased only slightly over the 1993-1998 period.

No official breakdown of investments and general expenditure is available. It seems that funding from the State budget, loans and other sources in principle is for investment, including rehabilitation, only as indicated in Table 3.1. Funding by 'enterprises' refers primarily to the water-supply and waste-water facility operators concerned and covers rehabilitation investments, maintenance and operating expenditure.

The source of 'State budget' funding consists of: (a) Fees paid by Apele Romane to MWEP for water extraction and (b) penalties and subsidies from regional and local public budgets.

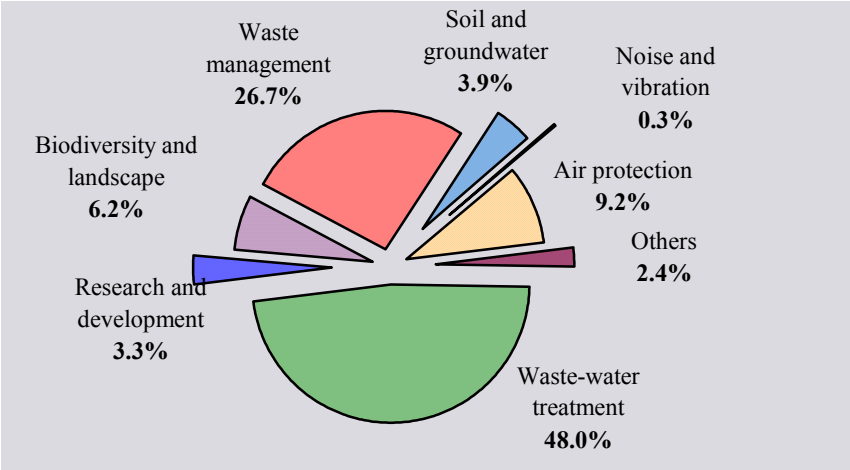
Table 3.1: National environmental investment and expenditure, 1993-1998

million US$, current prices and %

	1993	1994	1995	1996	1997	1998
Total sources	**9.52**	**20.68**	**38.24**	**59.84**	**146.48**	**228.40**
of which ***as % of total***						
Air protection	14.29	14.31	14.44	10.90	10.98	9.19
Waste-water treatment	47.48	46.23	42.05	48.46	47.90	48.07
Waste management	20.17	18.18	19.14	20.99	24.58	26.71
Soil and groundwater	5.04	7.93	8.47	5.48	4.81	3.89
Noise and vibration	0.63	0.12	0.09	0.20	0.11	0.19
Biodiversity and landscape	5.46	5.42	9.73	9.63	7.02	6.25
Research and development	2.94	3.29	2.62	1.67	2.16	3.31
Others	3.99	4.53	3.46	2.67	2.46	2.38

Source: National Institute for Economic Studies and Statistics, 2000.

Figure 3.1: Breakdown of environmental expenditure, 1998



Source: National Institute for Economic Studies and Statistics, 2000.

Table 3.2: Funding sources of environmental investment and expenditure, 1993-1998

million US$, current prices and %

	1993	1994	1995	1996	1997	1998
Total sources	**9.52**	**20.68**	**38.24**	**59.84**	**146.48**	**228.40**
of which ***as % of total***						
State budget *	24.37	32.30	31.59	34.36	34.08	32.92
Company sources	75.63	67.70	68.20	64.57	61.85	63.50
Loans (local/international)	0.00	0.00	0.21	1.07	2.87	2.64
Other sources	0.00	0.00	0.00	0.00	1.20	0.93

Source: National Institute for Economic Studies and Statistics, 2000.

Note:

* From national budget (water extraction fees) and regional/local budgets (penalties/subsidies)

Table 3.3: International support for environmental protection (grants), 1996-2000

million US$

Donor/programme	Type of assistance	1996-97	1998	1999	2000
EU Phare National	TA for inst. building and twinning		3.4		7.4
EU Phare CBC	Cross-border projects	1.4		3.4	5.8
EU Phare Regional	River management Delta ECO activities				18.0
EU ISPA	Waste-water treatment Water supply Waste management				110.6 a)
EU SAPARD	Special accession programme				22.5 a)
EU Life	Environment Nature			2.1	2.2
EU Stability Pact					538.0 b)
GEF/World Bank	Biodiversity	4.05 c)	5.5 d)		0.3 e)
Japan	Technical assistance		2.9		
Denmark	Technical assistance investments for: Waste-water treatment Water supply Air quality Waste management		40.0		
Netherlands	Cleaner technology	3.3	1.7	1.4	2.4
Switzerland	Municipal heating systems		3.933		
Norway	Heating system rehabilitation		0.6		
United States	Technical assistance Cleaner technology issues		33.3		

Source: Ministry of Environment, Economic Division.

Notes:
a) Annually
b) Application for financial projects, not yet obtained.
c) Project for the period: 1995-2000
d) Project for the period: 1999-2004
e) Pilot project (the total value is around US$ 10 million)

Environmental funds

Charges for the use of raw water (water extraction and waste-water discharge) are paid into a 'Water Fund' managed by the National Water Company, Apele Romane. The income is used for investment assistance in waste-water treatment, discharge control and other water-related investments.

For several years the Ministry planned to establish a formal 'environmental protection fund', which would have a broader revenue base. Investment activities would also be extended to cover environmental remediation and other environmental protection activities, environmental training and education. A Law on Environmental Fund was passed in 2000, but no statutes or operating procedures have yet been established for the fund. At present, the real difference between the existing Water Fund and the intended environmental fund is unclear, especially as regards where the money is going to come from. Given the present economic situation any funding from new taxes or instruments is likely to be limited and shifting funds from the present Water Fund or existing regional or municipal sources will not increase the overall investment capital.

As part of overall economic policy implementation, many sector-based or so-called special funds have been established: the road fund, the health fund, the fund for modernizing customs check points,

imposing a tax on all exports and imports, the fund for reducing the technological risk of equipment and industrial machines, levying a tax on the turnover of most industrial companies, etc. All in all 25 different 'special funds' were in force as of September 1999. Many of these 'funds' are non-environmental. Nevertheless, as most of the funds' taxes are outside the control of normal fiscal channels and managed directly by administrative bodies under the control of Ministries or Government agencies, the increasing number of 'special funds' has a negative impact on the acceptance and efficiency of the more 'official economic instruments', including environment-related instruments.

3.2 Privatization and its impact on environmental protection

Privatization process

The immediate aim of the economic restructuring in the early 1990s was to promote privatization and start the transition towards a market economy, with relatively short-term goals to ensure economic stability, reduce inflation, restore market equilibrium and stimulate economic growth through market mechanisms. Accordingly a package of legal reforms of the previous State ownership system was introduced in 1990-1991, to create and develop the private sector, by both privatizing State enterprises and establishing new private enterprises. The initial method and mechanisms for privatizing State holdings were:

- to issue 30% of State holdings in some 6,300 companies as so-called vouchers to the population, mainly as claims on commercial companies, and
- to transfer the remaining 70% of State holdings to the State Ownership Fund, for subsequent resale to general investors or privatization.

In August 1990 the National Agency for Privatization was set up and took over the above-mentioned 30% of State holdings and assumed responsibility for the subsequent issuing of vouchers to Romanian citizens. The Agency's vouchers were convertible and designed to be exchanged for shares in a commercial company or in the newly established Public Ownership Funds. The vouchers were primarily issued to the workers and staff of the Romanian workers' unions. The Public Ownership Funds were later reorganized into companies similar to mutual funds. In 1995 the scheme was updated by a mass privatization programme, with new vouchers being issued. In 1994 the Management Employee Buy-Out System was introduced so that vouchers issued in 1992 could be converted into shares in their own companies. The system was extensively used but the method was criticized as it did not attract real investment and led to abuse in the evaluation of assets and the creation of a voucher black market. The Management Employee Buy-Out System was, therefore, incorporated in the above-mentioned Mass Privatization Programme.

Urgent Ordinance No. 88/1997, modified in Law No. 99/1999, established the State Ownership Fund (SOF) as a legal public institution, accountable to the Government, for the purpose of selling and disposing of shares held by the State or local authorities. Certain strategic companies, however, were not privatized via SOF but by the Ministry of Finance or individual arrangements. Sales were made by open tendering, direct negotiations, bids or international equity issues.

In the 1992-1999 period SOF privatized some 7,000 companies, but the Government's share of the industrial sector was still 68% in 1999. The privatization process is continuing. Alongside SOF privatization, foreign companies are also making direct investments. The above developments in privatization and direct investment in the private sector are reflected in Table 3.4.

Current conditions and incentives for privatization

Up to 1998-1999, there were no specific environmental considerations behind the restructuring or privatization. The aim was national capital restructuring and short-term profitability. State-owned companies to be privatized included both profit-making and loss-making enterprises. Foreign investment was permitted in almost all economic activities, including natural resources, agriculture, manufacturing, construction, scientific research, trade, tourism, banking and insurance. Certain areas, such as electric, thermal and nuclear energy, natural gas, oil processing and railways, are still State monopolies. These areas — now operated by 'national companies'— will be gradually privatized and opened up to competition.

Public services

Water extraction and discharge to natural water bodies: The National Water Company (Apele

Table 3.4: Share of the public sector in the Romanian economy, 1991-1999

%

	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Share of the public sector									
in GDP	76	73	65	61	55	45	42	39	38
in agriculture	21	19	15	14	14	14	11	9	7
in industry	99	97	94	87	79	76	74	70	68

Source: National Commission for Statistics.

Note:

* Provisional data.

Romane) is responsible for the management and extraction of raw water, its re-supply to public services and 'receiving' treated waste water for discharge. Apele Romane is a public utility. Its operating costs are covered by the water extraction fees.

Water supply and waste-water treatment: At local level, county, municipal and communal public authorities are responsible for the organization and functioning of public services. They receive raw water from Apele Romane for distribution to consumers. There are approximately 400 public service operators in Romania, generally organized either as:

- Autonomous *regias* within the public authority or
- Commercial companies, based on a contract with the public authority

Both forms comprise facility management and operations only. Networks are considered public property, which also means that investment in both facilities and networks is paid or subsidized by the State or local authority.

The impossibility of financing the necessary rehabilitation, modernization, and extension programmes from the central and local budgets has led to efforts to attract private capital for public water and sewage systems. Without considerable investment in this area, the operation and maintenance of water-supply and sewage systems will become increasingly difficult, with more breakdowns and a decrease in the quality of service. Two organizational options are used to attract both private capital and managerial experience:

- commissioning a private company to manage and develop public assets, by concession, renting, management or by similar contracts, while the municipality (or Government) still owns the assets or
- transferring the property assets to a company and selling the shares.

Thus, the options for privatization and organizational methods range from a simple 'service contract' to full scale 'sale' as follows:

- a service contract; operations and maintenance are contracted out to a private/legal person;
- a management contract; management, operations and maintenance are transferred to a private contractor, usually for 3-5 years;
- renting; an entrepreneur rents the facilities from the public authority and bears the full commercial risk, usually for 5-10 years;
- Build-Operate-Transfer (BOT) contracts; a private company, or group of companies, finances, builds and operates the new facility. The BOT model may be further refined in the contract, which also stipulates the risks and guarantees;
- Concession; a private company is given the concession for managing, operating and maintaining the facilities and also for providing investment capital (in full or in part). At the end of the concession, all assets are transferred to the municipality or Government;
- Sale; this implies the transfer of ownership rights to the assets to the buying private company, usually by selling the previously municipality- or Government-controlled shares.

The process of privatizing public services still continues. According to Apele Romane's National Report of September 2000, it is encountering a large number of problems, including the absence of consumer level service measurements (or performance service on the basis of quantifiable parameters), the absence of penalties for non-compliance with the contract parameters; the

persistence of subjective and inefficient administrative relations between local authorities and the suppliers of public services, and the delay in or even blocking of the introduction of long-term contractual relations. There are also problems due to non-compliance with contractual terms; unfair competition on the public services market, the tolerance of political, professional or other types of cronyism; the lack of transparency in privatization and restructuring processes; the tolerance of conflicts of interest between personal business and public duty; the lack of objective professional monitoring of the quality of work; the continued administrative and managerial confusion in the public administration and its relations with public service suppliers; discrimination in dealing with citizens; the absence of mechanisms for improving the responsibility of administrative staff and motivating value-producing work; the lack of respect for laws, often due to the inadequacy of many regulations governing the specific needs of public services.

Furthermore, the urgent need for technical improvements just to cope with existing service requirements, under very tight economic conditions, is likely to further downgrade environmental issues for quite some time to come.

The banking sector

Like other sectors, the banking sector too is fully open to privatization and foreign investment, and many private banks operate in Romania today. At the moment, there is no industry to which to lend and companies are unable to pay a profitable interest. The banks are, therefore, more interested in alternative investments, including investments and deposits abroad. Until the private sector industries themselves start working under market conditions and with market tools, the banks are not likely to get involved in environmental investments.

Impact of privatization on environmental protection

According to Law No. 99/1999 on the privatization methodology, all companies earmarked for privatization have to prepare an environmental assessment (See Chapter 1). The cost of preventing and abating pollution is estimated to the extent possible. All EIA documentation becomes part of the buyer's contract and thereby of his legal contractual obligations. The above documents must be presented as a condition for obtaining the operating permits. The stages and overall time frame of the environmental compliance plan are generally agreed in such a way that they do not pose too serious a constraint, which could seriously affect production continuity and competitiveness. As a general rule, the environment authorities will stipulate the main objectives for environmental quality, allowing the firms to find the most efficient ways and means of meeting these objectives.

In practice, a number of factors conflict with environmental considerations:

- land prices are generally low and therefore set a natural limit on the sales price. The environment liabilities may easily be higher than the market value of the company;
- the environmental assessments (and the buyers' liability) do not include hazards from old equipment and buildings above ground and often present serious environmental risks;
- the Government is in serious and urgent need of the sales revenue, not least foreign investments representing capital and new technology. There is a risk that the assessment level may be set deliberately too low, thus reducing the buyer's clean up obligations and cost. Also the time schedule for remediation may be extended to become more attractive to a buyer;
- In case of non-respect of the compliance plan, the administration can refuse to renew the permit. But refusing to renew a permit requires political will, because it entails job losses, negative publicity in investor circles, while the environmental damage remains. To avoid the problem, the buyer will not officially ignore the compliance plan, but be tempted to bypass the formal channels (SOF, EPIs and the permit office) and submit a request directly to a higher political authority (Environment Minister) to renew the licence;
- Buying companies are only required to provide a bank guarantee for the purchase price, not for the environmental liabilities. In case of non-compliance, a penalty of 30% of the obligations not fulfilled according to the time schedule may be imposed. However, such a sanction has never yet been applied;
- According to Ordinance No. 88/1997 and Law No. 99/1999, 20% of the sales revenue is allocated to the SOF for additional analysis of the environmental damage or to supplement the analysis provided by the company itself. This percentage was to be reduced to a maximum of

10% of the sales revenue from January 2001. This reduction will of course seriously limit the ability of SOF to make its own analysis to verify a company's assessment of old damage and the real extent of the clean up required from the new buyer.

In addition to administering the privatization process through sales, Ordinance No. 88/1997 also authorizes SOF to start exposing companies earmarked for privatization to real market forces, thereby making them technically and financially more attractive to investors in the first place. The 'healthier' the company at the time of sale, the bigger the chances that the buyer will take over and meet his environmental obligations. The restructuring of State companies prior to privatization should be given higher priority, maybe even become a condition for being put up for sale. Restructuring should include clearing of arrears, optimizing human resources, terminating loss-making contracts, closing technically uncompetitive production lines, reducing or ceasing polluting production above limits and, furthermore, removing from the plant old equipment posing environmental hazards and which is not to be taken over by a new buyer.

3.3 Conclusions and recommendations

Economic instruments for environmental protection

Integrating environment-related economic instruments into economic development policies is a new issue for Romania. Compared to other central and east European countries relatively fewer economic instruments have been truly implemented in Romania and generally with very low charge levels. However, it also appears that there are many ideas, plans and proposals for new economic instruments. In this connection it should be noted that to be considered 'economic instruments', rather than general fiscal taxes, the charges should have realistic levels to guarantee the intended impact on economic policies. Furthermore, the present interpretation of the 'polluter-pays principle' seems restricted to recovering the cost of monitoring the 'permitted pollution' and levying a limited penalty in case of non-compliance. While some of the present instruments have environmental aspects, they do not represent 'an integration in overall economic policy development and implementation' but merely a number of stand-alone taxes, revenue and penalty mechanisms. The instruments do not offer an incentive for new low-cost measures and alternative technologies and changes in behaviour. It seems that at least up to recent years the environment-related instruments were not designed for incentive purposes but rather to raise revenue to finance general reforms and budget deficits.

If economic instruments are to function they need costly, efficient administrative systems and enforcement structures. So when a new instrument is contemplated, operating alternatives and cost and whether consumers can afford it must be taken into account. The actual net revenue of a planned environmental instrument may be limited, even negative. In discussions with Ministry officials and external stakeholders it was repeatedly mentioned that the constant high pressure on Romania to focus on EU accession requirements forced the Ministry to prioritize and allocate a disproportionate amount of resources to strategy developments, preparing plans, approximation issues and institutional strengthening and reforms, leaving too few resources for developing the practical administrative mechanisms needed to implement and enforce the planned economic instruments.

When planning an economic instrument – whether environmentally oriented or not – detailed operating mechanisms, monitoring and enforcement methods have often not been fully developed or have been considered only in a very general way. This has led to confusion, delays, errors, and different interpretations at the lower administrating levels and in turn to public frustration.

<u>Recommendation 3.1</u>:
When defining 'an environmental economic instrument' the Ministry of Waters and Environmental Protection should put far more focus on how to apply the instrument and how to implement the measures: at which level, with which tools, the efficiency of collection and enforcement procedures, various alternatives, etc. The analysis should be used to design feedback mechanisms so that the instrument will achieve the intended reaction by the target groups, without endangering or being counterproductive to other aspects of economic recovery.

<u>Recommendation 3.2</u>:
The Ministry of Public Finance and the Ministry of Waters and Environmental Protection should analyse the existing environment-related instruments and – where relevant – adjust them to market conditions and to true cost to ensure

sustainable resource use. Rather than basing charges on the lowest income level, the charges should (gradually) rise to levels of consumer affordability, with subsidies for lower income groups if required. The 'polluter-pays principle' should be adjusted to include all costs of remedying both permitted and illegal pollution, including the clean-up of specific damage.

Recommendation 3.3:
It is necessary that industry becomes an integrated part of environmental protection and management in Romania, fully bearing its responsibility. In particular:
(a) Enterprises should be required to insure themselves against environmental damage and accidents;
(b) The charge structures should be deterrent, forcing and inviting industry to consider environmental and clean technologies, including waste recycling and reuse, as new industrial possibilities.

The establishment of an environmental fund has been discussed and planned for several years, with repeated revisions of a draft law. The fund's statutes, management, staffing and organization, application procedures, project selection and assessment criteria, all vital for its efficient operation, still need to be defined. An important funding source could be debt-for-nature swaps as in other central and east European countries. The principle of debt-for-nature swaps is that a foreign Government agrees to waive all or part of Romania's current debts on the explicit condition that the Romanian Government deposits a corresponding amount in a fund specifically earmarked for environmental investments in Romania.

Recommendation 3.4:
The Government should immediately take the necessary steps to fully establish and implement the environmental fund. Its statutes, management and operational procedures, and organizational and logistical set-up should be set out. The fund should aim at generating and managing funds, from national, international and bilateral sources, and not be simply a disbursing mechanism The structure, objectives and operations of the fund should comply with the 'St. Petersburg Guidelines' on Environmental Funds in the transition to a market economy, prepared by the Organisation for Economic Co-operation and Development (OECD).

Privatization and environmental protection

Establishing and improving economic instruments for environmental protection cannot be viewed in isolation. Their success or failure depends entirely on the issues raised under Recommendation 3.3, which include the efficiency of the supporting administrative systems and the elimination of barriers, both within the Ministry of Waters and Environmental Protection and in other Ministries with some influence on the instrument in question. Unless these barriers are removed, the instrument will have only a limited – and often negative – overall effect. Many previous reports have identified such barriers, the most recent and comprehensive being the 'Red Tape Analysis' of May 2000, [prepared by the United States Agency for International Development (USAID) and the Centre for Institutional Reform and the Informal Sector (IRIS)] and 'Romania – Administrative barriers to investment' of November 1999 (prepared by the Foreign Advisory Service and the World Bank). In addition to identifying very specific barriers, they offer detailed recommendations to eliminate them. There are, unfortunately, no indications that these or previous similar recommendations have as yet had any impact, and, in fact, the interviews revealed that even more barriers had appeared. Since the analysis and recommended actions are available to the national industry and the public, as well as to possible foreign financing sources, the present dilatory approach to eliminating barriers has negative external effects also.

Recommendation 3.5:
The Government should disseminate and make appropriate use of the USAID and IRIS 'Red Tape Analysis' and the 'Administrative barriers to investment' as identified by the Foreign Advisory Service and the World Bank, in particular in order to improve the country's environmental performance.

The planned reduction, from 20% to 10% of the sales price, in SOF resources for initiating environmental analysis and controlling the environmental obligations of new buyers, will have a negative impact on the environment. The purpose of the reduction is apparently to raise net sales revenue for the Government. Potential buyers will likely interpret this as a readiness by the Ministry to reduce the buyer's environmental obligations. There also seems to be pressure on SOF to complete the sales process even more quickly, so that the sales revenue will be taken in earlier. The

problem is further aggravated by the fact that the EPIs do not have the experience or the technology to ensure proper and reliable analysis either.

Recommendation 3.6:
It is recommended that the Government should analyse the possibility of increasing to 20% the maximum ceiling of revenue from the privatization of assets devoted to environmental damage analysis in order to ensure that damage originating from the company's previous operations is fully identified and documented. Alternatively, this percentage should not be decreased until the State Ownership Fund (SOF) has created a working 'fund' sufficiently large to enable it to meet its legal environmental obligations.

The environmental assessment process is expected to identify and document the type, extent and estimated cost of the clean up of old damage by the State-owned companies earmarked for privatization. The physical clean up then becomes a contractual obligation for the new owners. Buyers of privatized companies must present a bank guarantee for the purchase, but no financial guarantee is required to ensure that they will eventually meet their obligations and comply with the agreed clean up plan. Legally the MWEP may refuse to renew the operating permit, normally valid for five years. MWEP may also fine the company up to 30% of the cost of the overdue clean up. Indications are that the companies are tempted to bypass the normal channels to obtain a permit, a situation that should be prevented.

Recommendation 3.7:
Buyers of State-owned companies should be required to arrange for a bank guarantee for their environmental obligations (e.g. 20-30% of the cost) to be deposited with the Ministry of Finance. The guarantee will be released when the Environmental Protection Inspectorate (EPI) confirms that the company has complied with its environmental commitments as per sales or purchase contract.

Chapter 4

ENVIRONMENTAL INFORMATION AND PUBLIC PARTICIPATION IN DECISION-MAKING

4.1 Environmental awareness in Romanian civil society

As a country in transition, Romania is facing deep structural, economic, social and institutional changes. The switch to a democratic public debate leads to high levels of uncertainty in nearly every field of social endeavour, with a specific stress on material organization and economic problems. In this context, it is hard to estimate objectively the relative importance of the environment for public opinion.

Opinion polls on the environmental concerns of the population are seldom used as tools in public or private decision-making. A national NGO, the Foundation for an Open Society, launched a Public Opinion Barometer in Romania in 1996, using the same questions every year. The 1999 opinion poll dealt with living conditions, political opinions, and values, without addressing the ecological awareness or civil practices of the Romanian people. An opinion poll in the Bucharest region showed that public interest in environmental topics was very low: environmental problems came at the end of the list proposed, far behind living conditions or respect for the law.

Institutionally, environmental measures are given political priority, as they are part of the process of approximation to European Community legislation. The different steps towards EU accession are very important for the Romanian central authorities. The current European harmonization of institutional structures and information systems requires steady support from all the social sectors. The general feeling that the public is not very interested in environmental problems (even if not confirmed by a genuine social survey) places the central and local authorities, and the NGOs, under pressure to arouse environmental public awareness through information campaigns and public participation in decision-making processes. The educational, training and research aspects are also proving very important in this respect.

The social, economic, political and historical situation of Romania plays a major role in the public's vision of environmental issues. The recent past is as important as the present context for understanding current perceptions of environmental problems. During the communist period, in particular after 1973 and the first oil shock, Romanian civil society had to face a paradox: the central government allowed industry all sorts of abuses of natural resources and the environment in its search for intensive industrial development, whereas early scientific ecological education and many small everyday life constraints obliged the general public to reuse and recycle materials and save energy.

Before 1989 this centralized State organization existed without any authorized NGO. Today the interaction between civil society and organizations is still deeply influenced by this historical background and can partly explain people's relatively weak participation in any kind of collective action. Various international and European development programmes present in Romania have brought an invaluable impetus to the reconstruction of civil society by explicitly encouraging the participation of NGOs in the democratic transition, a process that will certainly take a long time before yielding results.

4.2 Environmental information

The Environmental Information System and Data Management

In addition to pointing to the need for an integrated monitoring system (See Chapter 1), the NEAP also calls for the development of an *environmental information system* and *a state-of-environment reporting system*. Both of them will be tools for implementing environmental protection decisions and for informing the population on environment-related issues.

Information on the state of the environment is one of the legal duties of the MWEP assisted by its reference laboratory, ICIM, which launched a

project on environmental indicators for Romania in 1999, from local level to national level. A complex network of institutions, including the local EPIs, is theoretically concerned with data production (Chapter 1 on monitoring) and also with disseminating information to the public and to the business community. The most recent State-of-the-Environment Report (SoE) is posted on the MWEP web site linked through EIONET at the European Environment Agency in Copenhagen. The MWEP releases extensive information on the state of environment to the mass media.

At local level, participative structures that will use this environmental information are being created:

- The Local Environmental Action Plans, managed by the local EPIs, are drawn up with the involvement of businesses, representatives of the local administration and civil society. Informing the public about environmental objectives is one of the first steps to be taken, as can be seen from examples of the Bacau or Neamt county plans, which were the first to be started in 1998.
- The Agenda 21 process, programmed over three years in pilot city halls, started in November 2000. Agenda 21 implementation action has started in seven towns (Ploiesti, Giurgiu, Ramnicu Valcea, Galati, Targu Mures, Iasi and Oradea), with the support of the United Kingdom and Canada. The local Agendas 21 are followed by the National Coordinating Committee, in which the MWEP is represented through its Directorate for Strategy, Political Guidelines and Legislation at decision-making level and by the "UNEP, Agenda 21; UNECE and Environment for Europe" Team. Other ministries, research institutes and NGOs (Centras Ecosens, Pro Democratia and the Strategy and Development Foundation) are also represented in the National Coordination Committee. Public meetings and participation of the inhabitants in a consultative forum to identify "real problems" which are part of the announced process have not yet been programmed, as would appear from the Ploiesti Agenda.

Environmental Statistics

Romania's national system of environment statistics is being reformed with national and international help. The new field of environment statistics is the work of a small unit (four persons with a small budget) within the Directorate of Agriculture, Forestry and Environment of the National Statistical Commission. The 1999 statistical work plan specified five elements to be taken into account in developing official environment statistics: environmental expenditure, air quality, land use, pesticide use and the compilation of a statistical compendium, issued yearly since 1996. A recent NEAP agreement between the MWEP and the National Statistical Commission (CNS) established for 2001 the production of specific data on waste, emissions, water, protected areas and pressure-state-response indicators. Social data on environmental practices or opinions will be included in the 2001 human development report.

Since 1989, Romania has gradually adopted European and international environmental data gathering programmes, even if local data production conditions are still very affected by the economic, institutional and social difficulties. Official documents and institutional reforms demonstrate Romania's clear intention to adopt European and international policy systems, which imply permanent changes and challenges for national data production. The above-mentioned reforms of the statistical system were undertaken for this purpose. Romania has also participated in the Environment and National Resource Information Networking (ENRIN) since 1997. A project for joint ENRIN/UNEP implementation was developed in 1998.

At European level, national efforts towards accession demand concrete action to improve statistics and information. Efforts to strengthen the statistical system have continued, and progress can be recorded in a number of areas (e.g. complete national accounts, price statistics, labour force surveys, business registers and several other areas of business statistics). However, both environment statistics and household surveys and agricultural statistics still need to be improved, according to the Regular Accession Report (October 1999, European Commission).

Public Access to Environmental Information and Dissemination practices

Access to information is a constitutional right in Romania (art. 31.1 of the 1991 Constitution). The Law on Environmental Protection (No. 137/1995), which establishes the general framework for policy, provides a specific right of access to information on the quality of the environment.

The MWEP has published a report on the state of the environment (SoE) every year since 1996. The national report is compiled by ICIM on the basis of the data provided by the research institutes, the National Water Authority "Apele Romane", Romsilva, the National Commission for Control of Nuclear Activities (CNCAN), the Romanian Authority for the Danube Delta Reserve and EPIs. Each EPI produces a yearly SoE report for its county, on the basis of specific local data. The local SoE report is available for inspection on demand, and a limited number of printed copies are available free of charge. There is no explicit dissemination strategy. The press release is considered to be the main distribution channel, both nationally and locally. Environmental NGOs do not rely solely on the SoE report, as they mainly use other sources of information: companies or international NGOs, the population, their own independent measurements and Internet data sources (especially for the legal cases). A short abstract of the main figures in the SoE report, similar to those in the press release, is available on the Ministry's web site (http://www.mappm.ro). The MWEP publishes a magazine dedicated to environmental issues. . The National Commission for Nuclear Activities Control also publishes an Annual Report on Environmental Radioactivity Surveillance in Romania, with no apparent public dissemination strategy, except for the availability of the report itself and the usual communication to the media. ICIM publishes an environmental magazine with large dissemination, even abroad. There are other environmental bulletins, and radio and TV programmes dedicated to environmental issues.

Besides institutional information, most of the NGOs are very much concerned with information to the public. In "Atitudini" (Attitudes) magazine, financed by PHARE, they publish news about environmental actions and policies. In the magazine "Perspective", the Romanian Environmental Journalists Association (ARZM) deals with environmental issues, giving explanations about environmental phenomena and policies. Many specialized NGOs publish booklets and magazines, such as ROMAQUA, issued by ARA, the professional water association, for technical and scientific information on water management or "Marea Noastra" (Our Sea), a magazine published by the Liga Navala Româna (the "Professional of the Sea" Organization), for information on marine ecology. The Resources and Information Centre for NGOs in Constanta (CIER) produces general ecology and thematic information which is disseminated to the public free of charge. In natural protected areas such as the Danube Delta under the Biosphere Reserve Authority (Man and Biosphere (MAB) Reserve of UNESCO) information brochures and other good quality educational publications intended for visitors are produced, but sparsely disseminated.

4.3 Public participation in environmental policies and procedures

Civil society representatives, together with various media, are voicing a "social demand" for environmental protection. It appears that NGOs are particularly active on ecological issues, even if their position in civil society is not well established in comparison with international or Western local NGOs. The 1995 Law on Environmental Protection stipulates in article 5 (paragraph C) the right of the public and NGOs to be consulted in decision-making concerning the development of environmental policies, legislation and regulations, and the issuing of environmental agreements and permits (territorial and urban planning included, see also Chapter 2). Basic information has to be provided before consultation. The right to initiative (for direct democracy referendums) does exist but with no specification as to the topics concerned.

ECE Aarhus Convention

Romania ratified the *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environment Matters,* signed at Aarhus (Denmark) in 1998, through Law No. 86 of 22 May 2000. The definition of environmental information is very large and aims at offering every individual the means to know whether his or her rights to a healthy environment are being respected. The Convention establishes concrete modalities for public participation and conditions for public debate in the environmental decision-making process. This includes planning and programming policy and strategy and special projects. The Integrated Monitoring System in the MWEP is considered a reinforcement of the institutional framework to ensure implementation of the Aarhus Convention.

Public Participation in National Policy Objectives

The creation of a legal and institutional framework to foster dialogue between the authorities and civil society on environmental strategy, policies, programmes and decisions and the social and

economic development of Romania was one of the medium-term priorities in the NEAP approved in 1999. With the ratification of the Aarhus Convention, this legal framework has now been officially established and the main issue now is just how to make use of it.

The NEAP is said to be a practical application of current government policy on environmental protection closely linked to the sustainable development objectives. Ministries, institutions subordinated to the State, the business community, NGOs, the public, political parties and any other groups representing civil society are called on to participate in carrying out this policy. The National Strategy for Sustainable Development (1999) was produced with the participation of civil society representatives assisted by UNDP through the "National Centre for Sustainable Development" project, under the auspices of the Romanian Academy. One of its objectives, as in the NEAP, is to "develop a coherent legislative and institutional framework, compatible with that of the EU countries, and to consolidate democracy by encouraging civic participation. During the development of the Strategy for Environmental Protection in 1995, as well as in the process to review it in 2000, the NGOs and trade unions were consulted.

Role and importance of NGOs

Environmental NGOs have been playing an increasingly important role in addressing environmental issues in Romania during the past ten years. The number of environmental NGOs is estimated at 200, out of the 5,000 foundations and NGOs listed in the Catalogue recently published by the Foundation for the Development of Civil Society (FDSC). The definition of an NGO laid down in Order No. 26/2000 on foundations and NGOs includes natural and legal persons whose aims further either the general interest or *non-profit* objectives. This concerns not only associations, but also professional bodies, local volunteer groups, and all kinds of foundations and pressure groups. Now, the challenge for environmental NGOs is to qualify as a "public benefit" NGO, which grants them fiscal advantages and public support.

The environmental NGOs participate with local, regional or international governments, agencies and institutions in various cooperative projects. They are active in educational activities, nature protection (including monitoring fauna and flora), biodiversity and climate change. Membership is very low; an average NGO has fewer than 10 active members, a "big" NGO about 60 members and they are dependent on external financing programmes and fund raising, mainly from international organizations. This makes them vulnerable in civil society, as they cannot rely on wide popular support for their actions. For this reason, information and education are often promoted by NGOs (sometimes in cooperation with public or private institutions) in order to raise environmental awareness. Besides, international NGOs such as Greenpeace and Friends of the Earth have not shown enough interest in cooperating with local NGOs except in crises.

Public Participation in Decision-making

National plans and programmes

The period when the first national strategy for the environment was drawn up in 1995 is considered by NGO representatives to have been one of more active collaboration with the MWEP than the period after 1996. When the NEAP was updated in 1998, the NGOs were absent. They were associated with the Medium-term Development Strategy, in ten working groups. The NGOs are part of the National Sustainable Development Forum, and 750 of their members (for all topics) were consulted at different stages of the preparation of the National Strategy for Sustainable Development, organized and financed by UNDP.

Communication and cooperation between the MWEP and the NGOs are not satisfactory at present. NGOs are frustrated at not getting any response to their repeated attempts to establish collaboration (letters, invitations, etc.) with the central administration. In the Ministry, a special department led by a State secretary has recently been established. It is in charge of communication with the Parliament, trade unions and NGOs. The spokesperson for the Minister works in this same department. There are projects between EPIs and NGOs to develop a partnership under the LIFE Programme. With a view to implementing the Aarhus Convention, the Ministry cooperates with the NGO "Ecosens" to establish a pollution release and transfer register (PRTR) based on the research institutes' experience and an existing database. Nevertheless, NGOs are under the impression that they are fed one-way information (as members of the public) or that they exist to rubberstamp already-made decisions.

In the approximation process, despite European recommendations, NGOs are not invited to

participate in interministerial working groups for renewing legislation in accordance with EU requirements. The NGOs report easier cooperation with the Parliament's Public Relations Office. In the legislative process, during the 23 months of preparation they can comment on draft laws, communicate documents and formulate proposals, which are reviewed in the Parliamentary Committee for the Environment.

Cooperation and participation are far more effective at local level, where the NGOs are particularly present and active. However, local situations vary considerably. Sometimes NGO initiatives to amend regulations are taken into account by local authorities. The EPI-Galati and the NGO "Earth Friends" cooperated on a REC project that financed public participation in permits (for construction, new activities, etc.).

Public participation in the environment impact assessment (EIA) procedure

The Law on Environmental Protection establishes the obligation to organize a public debate for EIAs concerning economic activities listed in its Annex II (see also Chapter 1). The final decision-making power remains with the central administration. The right to participate (without voting rights) in the decision making process is granted equally to NGOs, individuals or ad hoc groups. New activities are under a single regulatory regime. Existent installations are obliged to produce an environmental assessment and, if need be, to modify the equipment so as to meet environmental standards within five years. The EPIs decide the degree of environmental assessment required. Depending on the case, the procedure may be limited to a declaration, a communication of existing data, or it may require a study of the health consequences or a risk study (for hazardous plants). Public debate is also possible for existing installations.

The first step in the EIA procedure is to announce the new project in the local press and public notices in the local EPI. If there is no reaction from the public after 30 days, there is no debate. When NGOs, members of the public, or ad hoc groups raise an issue of any kind, the EPI organizes a public debate. The NGO "Ecosens" has issued a handbook to clarify the procedure of public participation for the public of Bucharest. Public debates are not routine practice. The meetings are more often an occasion for technical experts to deliver information to the public, rather than a real debate, according to the NGOs interviewed. Examples of successful debates and public action were reported, mainly for existent installations, e.g. the renovation of the railroad system in the Brasov region. Other reported experiences of participation, e.g. public debates organized by the Constanta EPI and the industrial firm involved in the extension of petroleum extraction activities in the Black Sea in 1998 and 2000 were limited to technical information and consultation, with no debate possible on the project itself.

Public participation in Local Agendas 21

The six pilot city halls (Ploiesti, Giurgiu, Ramnicu Valcea, Galati, Targu Mures and Iasi) involved at a local level in the implementation of Agenda 21 are getting down to their real work, after a series of preparatory meetings and organizational measures. Local Committees have been established. They bring together representatives of the county EPIs, local administrations, the business community and NGOs. After having established the local development and environmental priorities, the next stage provides for public information campaigns and debates.

Sustainable development actions in Agendas 21 are not just environmental. For this reason, the association of local EPIs may depend on the local issues at stake. In Galati, for instance, the EPI was integrated into the Local Committee under NGO pressure (one of the NGOs had pulled out of the process in protest at the exclusion of the EPI). Now the EPI is being associated with the local Agenda 21, but this is not the case for all the NGOs concerned. In Constanta, the idea of implementing an Agenda 21 was abandoned after one meeting, since the NGOs thought there was no public interest or support for it. In Bucharest, Ecosens published a booklet in July 2000 in favour of a local Agenda 21 for the capital, which assesses the social, economic and environmental situation and was conceived as a handbook for public participation.

The local implementation of the NEAP and Local Environmental Action Plans (LEAPs) can be seen as redundant or in competition with local Agendas 21. The LEAPs are implemented by the administrative authority, the EPI, under the responsibility of the MWEP. They are more environment-oriented, and bring together all the local administrative decision makers. Two LEAPs were issued in October 2000, in Bacau and Neamt. In Bacau county, the Plan details local

environmental problems, how they can be solved and ways to evaluate environmental action (yearly monitoring). Public participation and awareness strategies are described in this document, as they are part of the objectives to be attained through local action.

4.4 Environmental education, research and training

Primary and secondary schools

Environment is taught at primary school from the first to the fourth levels in the "man and society" subject, and afterwards in the "natural science" curriculum. At secondary school, ecological education is taught from an interdisciplinary perspective (physics, chemistry, biology, geography) and independently in the biology curriculum. The Civic Culture curriculum in general and professional teaching contains references to ecological awareness. In the technical high schools (agriculture, forests, sport) ecological aspects are present in the specialized courses. An optional "Ecology" class that deals with the scientific notions of ecology is proposed for either the general or the technical curricula. Summer activities are organized on environmental themes, as well as participation in national (e.g. CO_2 Day, National Competition for Environmental Projects held in Jasi-Muncelul camp for the first time in 1999 on the initiative of the Ministry of Education) or international competitions (e.g. International Olympiad in Turkey, where Romanian schools participated 5 times out of 6, winning many prizes). Children's Clubs are publishing many local reviews, such as *Eco*, *Ecological Universe* or *Nature's Friends*.

Cooperation between schools and NGOs on ecological projects is frequent. For instance, in Constanta, NGOs together with the University of Ovidiu and some members of the Antipa Institute organize educational sessions with classes on marine ecology. The Mare Nostrum NGO produces a weekly one-hour programme devoted to the environment on the local TV channel. With the help of the Harbour Administration, they have also organized a seashore clean-up operation in the Tomis Harbour.

University education

Twenty-one university curricula all over the country have environmental programmes or are entirely specialized in this topic. This may change with the current reform of the educational system, whereby responsibilities for education are decentralized, and university teaching is being privatized.

The role of various private foundations and NGOs in environmental education is very strong. The role of teachers' and pupils' organizations and sometimes of the local authorities in educational initiatives and achievements are noticeable too. In line with the Environmental Strategy, the MWEP supports the educational component in several domestic and international programmes. Also, concrete environmental actions are organized and conducted under the guidance of the EPIs. However, environmental educational actions are not given sufficient attention by the central authority, because there is no strategy in this very important policy area.

4.5 Conclusions and recommendations

The legal and institutional framework for monitoring and reforming the environmental information system is being established. Many implementation problems are related either to organizational issues or to the vague distribution of responsibilities between the different bodies responsible for producing and disseminating environmental information.

The difficulties in implementing the integrated environmental information system are related to cultural and political circumstances. Ongoing institutional and political changes create a very unstable organizational climate: there have been ten Ministers of the Environment since 1990, and many legal and administrative reforms have been started (see also Chapter 1). In these circumstances, measures to make data production more efficient and to improve the information system are not proving as effective as expected.

First of all, as far as the legal framework is concerned, the existing law on official statistics does not sufficiently clarify the status of public information and access to it. Besides, there is no general law on access to information in general, which would give a clear definition of public information and state the precise rights of access to it.

Recommendation 4.1:
The Ministry of Waters and Environmental Protection should, in cooperation with other relevant Ministries and NGOs, (a) systematically assess the legal requirements which will apply from 30 October 2001 following the entry into force of the Aarhus Convention and (b) develop and implement a strategy introducing the necessary measures to ensure full compliance with the Convention as soon as possible.

Two characteristics of the current institutional reform may well make the coordination tasks more complex and cause them to fail: the sub-contracting of public expertise capacities and the decentralization process (law of 1998), which abruptly transfers almost all competence from the central to the local level, after a long tradition of centralization. For instance, many national bodies (ICIM, Apele Romane, etc.) are faced with a decrease in State funds and will have to be self-supporting even in those tasks that are still of public interest. All the institutes concerned with environmental data (e.g. ICIM, Antipa Marine Research Institute, Nuclear Research Institute) have been reformed many times during the past years. Today they work under a hybrid status: they produce public data on a contractual basis for the MWEP and various international programmes, with very low public financial guarantee and support. Their research and consulting activities can only be carried out under the specific constraints of self-financing. Consequently, permanent and coherent data production is very dependent on *persons* in the administration as well as in the research institutes concerned. The reliance on persons rather than on formal organizational principles increases institutional vulnerability in general and the fragility of the data and information management system in particular.

In the absence of a national environmental protection agency that could manage the integrated monitoring system, the MWEP should at least consolidate the present unit in its Directorate for Ecological Control and Monitoring. Without specific administrative, personnel and budgetary means, this service is unable, in its present form, to carry out its proclaimed missions, that is "to provide reliable information on the current state of the environment, warn of the critical factors and foresee their evolution".

Recommendation 4.2:
The Ministry of Waters and Environmental Protection should improve the management of the integrated environmental monitoring system, at least by consolidating the present unit in its Directorate for Ecological Control and Monitoring. This unit should be given the specific administrative, personnel and budgetary means it requires.

The dissemination of information plays a very important strategic part in the development of a policy. It is a precondition for democratic participation in decision-making. In all official policy objectives, information and participation appear among the priorities, as an essential formal stage. But the formal right to information is not always translated into obligations in the regulations governing the activities, duties and procedures of decision-making bodies. The local situations are more varied. Local authorities also have an environmental information duty, but they do not know how to go about it (for lack of means, of trained personnel, of clear procedures and responsibilities, etc.).

The general information available is starting to be quite abundant. Nevertheless, precise or non-aggregate data are still difficult to obtain on specific environmental topics, such as contaminated areas, waste or urban air pollution. The concrete organization of the dissemination of information to the public is often a victim of more immediate material or organizational problems.

On the institutional side, there are no clear dissemination strategies apart from the publication of the legal documents. Dissemination practices are not concretely established as a priority at institutional level; they are erratic and irregular. The number of copies of the documents issued is unknown, as are the reasons for targeting specific public groups. There is no concept of data redundancies or gaps. At present, the Information Unit is composed of one person, who is also the Minister's spokesperson. This is still insufficient when compared to action under the 1998 PHARE Programme (See Chapter 5, cooperation with EU) and Handbook, which advised a complete reform of the organization of the MWEP with a more important place given to public information and participation.

The responsibilities for environmental information are scattered among the organizations concerned with data production. As a result, there is a prejudicial trend to keep information from spreading until a person or a service has decided which kind of information is to be made public and

which not, on a case by case basis. In these circumstances, public information could be used by anybody for commercial reasons. This contributes to a climate of secrecy around the data that is likely to undermine public confidence in institutions even further, and consequently prevent a wider (NGOs, business community) use in decision-making of the environmental data produced.

Recommendation 4.3:
The Ministry of Waters and Environmental Protection should provide proper conditions for the Information and Documentation Centre (IDC) and its personnel, and together with its associated institutes define a clear strategy for the production and dissemination of environmental information. The IDC could be integrated into the Ministry or into the ICIM, with budgetary support for its public information activities.

Depending on the specific phase of the policies considered, the level of the decision-making process and the type of decision, the participation of NGOs and of the public can be more or less active. Access to information, i.e. the lowest level of public participation, is best represented at national and at local levels. However, the right to decide or to make joint decisions is sometimes effective at local level, and less so for national laws and regulations or national policies, strategies, programmes and plans. There, the role of NGOs should be strengthened.

Recommendation 4.4:
The central environmental administration should demonstrate openness and transparency in its relation with civil society in general and environmental NGOs in particular. The relevant units of the MWEP should keep the environmental NGO community informed on all relevant national and international programmes.

In general, the public debate procedures are described as "weak" by the NGOs. Public debate is not organized systematically because of a lack of funding. In the EIA procedure for new activities, the public and the NGOs do not have the material or professional means to produce counter-expertise on technical matters, so their action is very limited. Cooperation among NGOs on specific action is possible, but it is not the rule.

At the national level, participation in the preparation of plans and programmes is very dependent on political orientations. For EIA procedures, the list of activities (Annex II) mixes high-risk activities with small industrial plants, which does not make for a reasonable strategy for public debate. At present, communication with NGOs and participation in the procedures are satisfactory on neither side. The lack of continuity in the participation procedures and the excessive personalization of the institutional processes are undermining the efficiency of actions.

The example of the PHARE Programme actions in 1998 illustrates this point. ICIM finalized and handed to the MWEP administration two documents with PHARE support: a practical handbook for public participation, detailing the methodologies and ways of managing a public debate, and a proposal for a complete reorganization of the Ministry, giving information and participation a more important place. In 2000 the PHARE programme continues to develop public awareness strategies, while the previous recommendations and tools were neither implemented nor disseminated among social sectors. Other important strategies have recently been issued, for instance the "Public Awareness Strategy" of June 2000 under the leadership of the MWEP and the Danube Delta Biosphere Authority in Tulcea. An implementing action plan was also drawn up. It is to be hoped that it will now be implemented.

Recommendation 4.5:
The Ministry of Waters and Environmental Protection should reinforce public participation in EIA procedures. In particular, the development of specific ways to organise public participation (hearings, additional public platforms) should be given particular attention (possibly through regulatory obligations).

Recommendation 4.6:
The MWEP should encourage the environmental NGOs to form a national forum to participate in the current reform of legislation for EU approximation.

One of the priorities of the current National Strategy for Sustainable Development is "to create human resources meeting international scientific, technological and information standards in all social and economic sectors". In 1998, research, development and training represented less than 3.5% of total expenditure on environmental protection (See Chapter 3).

The importance of training and education is underlined in all the national and local environmental plans and programmes. However,

environmental educational action is often carried out on a voluntary basis by the Children's Clubs, with local scientific and cultural institutions. The recent reform and the Law on Education do not address environmental education. No official protocol has been signed between the Ministry of Education and MWEP on this topic. Neither ministry has dedicated services or officers responsible for environmental education. In the Ministry of Education, the regular inspectors also follow environmental matters. In the framework of the recent decentralization, the local authorities (EPIs) are given responsibility for supporting environmental education programmes in schools.

Recommendation 4.7:
The Ministry of Education and Research should ensure that:

(a) The national education programme would contain a clear definition of environmental education requirements. Cooperation with the Ministry of Waters and Environmental Protection (MWEP) on this topic is recommended. An agreement between the Ministry of Education and the Ministry of Waters and Environmental Protection on environmental education, followed by joint action and evaluation, would be needed.

(b) The training of trainers in environmental matters is strengthened.

Most of the environmental action either in the public or in the private sector is carried out with the support of international programmes. The large number of programmes does not allow any real coordination between them, or an effective use of the work already done. International programmes should require the integration of previous results on the same topics. International programmes should monitor the real conditions of public participation, and ensure their practical organization through precisely allocated budgets for public participation and information.

Chapter 5

INTERNATIONAL COOPERATION

5.1 International cooperation to protect the environment and strengthen institutions

Objectives of International Cooperation

The Environmental Protection Strategy was updated in 2000 and contains short-, medium- and long-term objectives for international cooperation in environment protection, which can be summarized as follows:

- Romania aims to strengthen its institutional capacity through participation in environmental agreements and through bilateral, regional and multilateral cooperation;
- The legislative framework will be strengthened through the harmonization of national legislation with EU legislation, with the objective of becoming a member of the European Union, and through the ratification of international environmental conventions;
- International funding and technical assistance will be attracted to accelerate the implementation of environmental protection policies.

Romania is in the process of acceding to the European Union and intends to implement EU legislation. The EU Accession Partnership 1999, which was developed by the European Commission and revised in February 2000, sets short- and medium-term goals for Romania's environmental protection policies. Romania is required to draw up detailed directive-specific approximation and implementation programmes. The Accession Partnership requires the complete transposition and enforcement of several parts of EU environmental legislation, as well as stronger environmental administration at national and regional levels.

Many EU legal acts include or are complementary to provisions from multilateral environmental agreements, which are transposed and implemented by Romania in seeking approximation to the EU policies. Furthermore, progress in environmental protection has to be an important strategic goal of foreign policies in the process of EU integration. Therefore, participation in international and regional environmental agreements and preparations for EU accession are considered as mutually supportive.

Environmental protection is to be seen in the light of sustainable development, linked to the economic and social development of the country. As a country with an economy in transition, Romania still lacks sufficient financial resources in the State budget, and this can delay the necessary environmental protection measures. Also private investment in environmental protection is still low. Romania hopes to attract additional international funds in order to accelerate the implementation of environmental protection measures.

MWEP and the National Environmental Action Plan

Within the MWEP, international cooperation and EU integration activities are mainly coordinated in the General Division for European Integration, Programmes, Projects and International Affairs. One sub-division deals with European integration; the other is responsible for programmes, projects and international affairs. On the county level, each of the 42 Environmental Protection Inspectorates have the mandate of assisting in the development and implementation of projects within the framework of international programmes.

Romania's NEAP includes concrete measures required by bi- or multilateral environmental agreements, and its objectives comply with the provisions deriving from them. Projects, which are (co-)financed by international or bilateral cooperation or by European Union Funds, are usually included in the NEAP. Also environment-related projects implemented by other ministries or institutions and public entities like municipalities or the private sector, are included in the NEAP. Since the 1999 update, the NEAP contains a total of 286 projects in its annexes. Financing is planned as follows: 60% from

domestic sources and 40% from international sources. At present the domestic sources represent 0.6% of GDP.

Inter-ministerial Coordination

Besides the NEAP inter-ministerial Committee, nine sector working groups were set up in 1999 to manage the transposition of EU environmental legislation. Besides the MWEP, these sector working groups include other relevant ministries and national institutions. By managing the transposition of EU legislation, many of these working groups, such as the working group on air quality and climate change, on nature protection and genetic modified organisms, on water quality, on chemicals and ozone-depleting substances, also deal with the implementation of international environmental agreements.

The Ministry of Waters and Environmental Protection and the Ministry of Foreign Affairs (MFA) are involved in all issues that relate to international or bilateral environmental cooperation. The European Integration and International Relations Division of the MWEP is cooperating with international organizations in Nairobi, Vienna, Rome, New York and Washington, D.C. The MWEP is, together with the MFA, also responsible for negotiating, signing and ratifying multilateral agreements. There is no proper "fund raising" strategy, but the MFA will transmit information on what technical cooperation possibilities are offered by international organizations.

5.2 Cooperation on global environmental issues

Climate Change

Romania ratified the United Nations Framework Convention on Climate Change in 1994 and ratified the Kyoto Protocol in 2001. A National Commission for Climate Change was established through Government Decision No. 1726 of 1996. It is chaired by the MWEP and is inter-ministerial.

Romania is drawing up inventories of its carbon dioxide, nitrogen oxides and methane emissions. Other gases will be regularly inventoried in the future in accordance with the Kyoto Protocol. It is envisaged that carbon dioxide and other greenhouse-gas emissions will be monitored and assessed, in compliance with the 1993 EU Council Decision for a monitoring mechanism of Community CO_2 and other greenhouse-gas emissions.

After 1989, emissions of greenhouse gases dropped significantly due to the fall in economic activity. Romania committed itself to an 8% reduction in emissions in the period 2008-2012 as compared to the base year, 1989. Romania has considerable potential for projects in the framework of joint implementation (article 6 of the Kyoto Protocol) (see Chapter 6 and Table 6.1). According to specialists' forecasts, it would be possible to achieve an extra 6% reduction in greenhouse-gas emissions at least, on top of Romania's 8% commitment.

In 2001 Romania signed a memorandum of understanding (MoU) with Switzerland, to establish the framework for "activities implemented jointly" under the Convention on Climate Change. Switzerland has provided technical assistance and funds (US$ 4 million) for a thermal energy project to reconstruct the district heating systems in the Romanian cities of Buzau and Pascani. This arrangement is a pilot phase for future joint implementation, which will include the crediting of emission reduction units under the Kyoto Protocol.

The Netherlands is also cooperating with the Romanian authorities on "activities implemented jointly". A project has already been implemented for the monitoring of power-plant emissions, renewable energy use and energy efficiency. The legal framework is provided by the framework MoU on economic cooperation between Romania and the Netherlands which was ratified by Romania in 1993. Funds and technical assistance for the projects are provided under the Netherlands programme for technical cooperation for south-eastern European countries (PSO). Further projects are under development. Austria, Japan and Norway have also expressed their interest in developing MoUs for joint implementation with Romania.

Protection of the Ozone Layer

Romania is a Party to the Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol and its London amendment. The Copenhagen amendment has already been transposed into national law and formal ratification by Parliament is expected soon. An Ozone Unit was created as the national focal point within the MWEP's Division of Directives, Implementation and Permitting, with the financial support of the

Multilateral Fund under the Montreal Protocol. The Ozone Unit has started the procedure for the ratification of the Montreal amendment to the Montreal Protocol.

A national action plan and a country programme to phase out ozone-depleting substances (ODS) were drawn up, and the country programme is currently being updated. Romania is committed to cutting its ODS emissions to zero between 2005 and 2015. Romania intends to implement the Montreal Protocol in advance, following the provisions for developed countries, in order to have eliminated ODS by the time it joins the EU. Romania cut its annual consumption of ODS to 1,069 tons in 2000. The use of methyl bromide will be banned in 2002 for plant protection and in 2005 for storage applications. Romania is now starting the gradual phase-out of ODS. The Ozone Unit monitors and licenses imports and exports of ODS in close cooperation with the customs authorities, and controls the import, export and production of ODS.

Romania regularly reports to the Secretariat of the Vienna Convention and the Montreal Protocol. With the support of the Multilateral Fund and the United Nations Industrial Development Organization (UNIDO), a project on institutional strengthening was implemented, involving a workshop for the customs authorities as well as a public-awareness campaign. The Ozone Action Programme of the UNEP Division of Technology, Industry and Economics is assisting Romania's Ozone Unit, in particular by providing technical information and publications.

In cooperation with UNIDO, a 'Refrigerants Management Project' was started in 1999. The project consisted of three components: (1) a training centre for commercial refrigeration service technicians for good practices in refrigeration maintenance set up in Cluj in 1999; (2) an ongoing recovery and recycling programme for refrigerants; and (3) the training of custom officers.

Romania is cooperating also bilaterally with neighbouring countries to protect the ozone layer. For instance, there is close cooperation with Hungary to control and license imports and exports, and 10-15 tons of ODS from Romania are recycled in Hungary per year. Romania's Ozone Unit is assisting the authorities in the Republic of Moldova, e.g. by providing information in Romanian.

Biological Diversity

Romania became a Party to the Convention on Biological Diversity in 1994. In 2000, Romania ratified the Agreement on the Conservation of Bats in Europe (EUROBATS, 1991), the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS, 1996) as well as the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA, 1995). Romania is a Party to the Bonn Convention on the Conservation of Migratory Species of Wild Animals and to the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat.

In 1996, a national strategy and an action plan were adopted for the conservation of biological diversity and the sustainable use of its components. These documents include the provisions and objectives of the Convention on Biological Diversity, of the other international conventions on the conservation of nature and the protection of biological diversity, as well as of the Pan-European Biological and Landscape Diversity Strategy.

Besides the ratification of the international agreements mentioned above, several other laws on the protection of nature and biological diversity were adopted in 2000. The new laws harmonize Romanian legislation with the EU body of laws on the conservation of natural habitats and of wild fauna and flora. The EU Council Directive on the conservation of natural habitats and of wild fauna and flora and the Council Directive on the conservation of wild birds are currently being implemented, together with several further pieces of EU legislation (e.g. regulating trade in endangered species). Full transposition will be achieved in 2001, by approving as a law Urgent Ordinance No. 236/2000 on the Protection of Natural Areas.

The universal value of several sites in Romania has already been recognized by international organizations. For example, the Danube Delta has been a Ramsar wetland site since 1991 and is placed on the World Heritage List of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Danube Delta, the Retezat National Park (1979) and the Rodna National Park (1980) were declared International Biosphere Reserves under the UNESCO Man and Biosphere Programme. Eight-hundred and twenty-seven areas were declared protected areas in

2000, according to the criteria of the International Union for the Conservation of Nature (IUCN).

The Danube Delta Biosphere Reserve Authority received assistance from a project of the GEF-World Bank (Global Environment Facility) on "Biodiversity Conservation in the Danube Delta" (from 1995 to 2000). Co-financed has been provided by GEF (US$ 4.5 million) and the Romanian Government (US$ 450,000). The project supported the Reserve Authority in strengthening its institutional and operational capacity, as well as in the preparation and implementation of a biodiversity monitoring programme, ecosystem rehabilitation and a programme for public participation and awareness.

Another GEF-World Bank project, "Biodiversity conservation management in Vanatori Neamt, Retezat, Piatra Crailului" (1999-2004), is being co-financed by GEF (US$ 5.5 million), the Romanian Government (US$ 2.4 million) and the National Administration of Forests (US$ 0.9 million). This project aims at strengthening the national framework for biodiversity conservation, and at developing models for protected areas and forest management.

Two further GEF-United Nations Development Programme (UNDP) projects are currently being prepared for submission. They concern the management of the Movile Cave and its associated ecosystems, and biodiversity conservation in the proposed Ramsar site of the Lower Prut River.

In 2000, Bulgaria, the Republic of Moldova, Romania and Ukraine created a "Green Corridor for the Danube", with the support of the World Wide Fund for Nature (WWF). This initiative will establish a transboundary network of wetlands along the Danube, so as to restore the floodplain habitats in the Danube river basin.

The same year, Romania, the Republic of Moldova and Ukraine signed an agreement on transboundary protected areas in the Danube Delta and the Lower Prut River, supported by the Council of Europe. With the support of the Ramsar Convention's Secretariat, a study was prepared by the Danube Delta National Institute for Research and Development, in order to identify additional sites in Romania to be proposed as Ramsar sites.

Since 1999 several projects have received support from the EU programme LIFE. They have a total cost of over US$ 4.3 million and are usually 75% co-financed by LIFE (maximum). The projects are in the conservation of nature and biological diversity (see Table 3.3).

Romania ratified the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) in 1994. The Convention is implemented by a ratification law and by a ministerial order. Romania is currently implementing the relevant EU legislation. Cooperation with the General Directorate of Customs and the other ministries has been established. The MWEP issues the permits and certificates.

Romania is active in the control of genetically modified organisms. The relevant EU Directives were transposed into national law in 2000 and now need to be implemented. Romania participates in the "Implementation of a national biosafety framework in the pre-accession countries of Central and Eastern Europe" project, running from 1999 until 2002. The project is financed by the Netherlands through its MATRA programme and aims at establishing a national framework in accordance with EU legislation as well as with the Cartagena Protocol on Biosafety to the Convention on Biological Diversity.

Desertification

Romania is a Party to the *Convention to Combat Desertification*. According to the definitions of the Convention, there are some areas that can qualify as "affected areas", e.g. in the south-east of Romania, which consist mainly of crop fields. Desertification is therefore seen mainly as an issue of drought control. Romania has the status of "other affected country" under the Convention and has submitted a national report to its Secretariat. A national strategy to combat drought and desertification is being drawn up.

Chemicals and waste

Romania ratified the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* in 1991. In the late eighties and early nineties, Romania experienced serious problems involving imports of hazardous wastes. The cases were solved in cooperation with the states involved, and the hazardous wastes were re-exported, following the principles of the Basel Convention.

Since then, Romania has enforced a ban on waste imports, except for some secondary raw materials (e.g. ferrous scrap, glass, paper, wood, and cloth). Romania has successfully implemented the Basel Convention's control procedure for transboundary movements (including prior written notification and consent), and the necessary cooperation between the MWEP and the customs authorities has been established. Recent attempts to illegally import waste involved post-consumer equipment, such as used refrigerators or used TV sets.

Romania is currently developing a new legal document to regulate the import, export and transit of wastes. The document will implement the new annexes VIII and IX to the Basel Convention (lists of wastes). Romania intends to ratify the "ban amendment" to the Basel Convention, which prohibits all exports of hazardous wastes from annex VII countries (OECD, EU, Liechtenstein) to other countries. The ban amendment has been implemented in the EU and currently prohibits hazardous wastes movements from the EU to Romania. In waste management, Romania is implementing the EU Waste Framework Directive and the Hazardous Waste Directive.

Romania has neither signed nor ratified the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. The import of hazardous substances is regulated, but the regulations are out of date and are not harmonized with EU legislation. The transposition and implementation of EU legislation is planned.

With regard to the issue of persistent organic pollutants (POPs), there are several sites with stocks of PCBs and PCB-containing equipment in Romania. A government decision on the management and control of the effects of PCBs and other similar components was adopted in 2000, in order to implement the provisions of the EU Council Directive on the Disposal of PCBs/PCTs. Romania participated in the negotiating process for the new international Convention on POPs.

5.3 Regional and bilateral cooperation

Transboundary pollution by accidents

In 2000, there were several environmental accidents in Romania. The most serious was the Baia Mare cyanide spill, causing considerable transboundary pollution (Box 7.1, Chapter 7 and Box 10.3, Chapter 10). In response, the UNEP/OCHA Joint Environment Unit – Disaster Response Branch organized an international rapid assessment mission to Romania, Hungary and Yugoslavia.

The mission provided a thorough description of the spill, its causes and an assessment of its environmental implications. Its recommendations included further risk and environmental impact assessment of the regional industries, emergency planning (according to the APELL process) and increased international cooperation to prevent and respond to emergencies.

Several successive fact-finding missions were undertaken by UNDP and WWF, as well as by the United States Agency for International Development (USAID) and Environmental Protection Agency (USEPA). UNDP started a project for the coordination of environmental emergency measures in Romania after the accidental spills. It also organized a training workshop on the management and prevention of water pollution incidents in the Somes-Tisza region for experts from government and from pollution hot spots. A UNDP-GEF project proposal on "the accelerated implementation of environmental management programmes for mining-related hot spots" in the Somes-Tisza catchment area of Romania is in preparation.

In March 2000, the EU took the initiative to set up a task force, "the Baia Mare Task Force", to follow up the consequences of the accident, analyse its causes and recommend preventive and remedial action. The Task Force was made up of officials of the EU Commission and international, regional and national bodies for the protection of the environment. Its conclusions and recommendations are reflected in Box 5.1.

Romania intends to develop a harmonized trilateral plan for emergency response with Hungary and Ukraine, for the rivers within the upper Tisza river basin. A trilateral meeting was held in Cluj (Romania), and the hot spots with potential transboundary impact were identified, including local, agricultural and industrial sites.

Furthermore, the International Commission for the Protection of the Danube River prepared an "inventory of high-risk sites" in the mining,

Box 5.1:

Conclusions and recommendations of the Baia Mare Task Force

Established by the Governments of Romania and Hungary, the EU Commission and the United Nations to review the mining accidents that occurred in early 2000 at Baia Mare and Baia Borsa in Romania, the international Task Force for the assessment of the Baia Mare accident made the following recommendations:

- Prohibition of closed-circuit tailings management facilities, unless adequate provision is made for emergency discharge and the storage of excess water;
- Cyanide and other hazardous process chemicals should be removed in the plant before the tailings are deposited in the tailings ponds;
- Steps to promote a 'safety culture' in mining and ore-processing operations;
- The introduction of binding conditions for the closure and after-care of mines and tailings management facilities;
- The early ratification by all member States and the European Community of the relevant UNECE Conventions and Protocols.

The Task Force also recommended:

- A series of measures to clarify and strengthen existing EU legislation on mining and ore processing;
- EU legislation pertaining to mining and ore-processing activities should be brought together in a single industry guidance document and endorsed the general approaches proposed in the European Commission's Communication on the safe operation of mining activities;
- The role, funding and decision-making procedures of the International Commission for the Protection of the Danube River (ICPDR) need to be strengthened.

extraction and ore-processing industries in the Tisza basin. Joint transboundary projects will be developed for submission to international donors, in order to improve the safety and risk management of potential sources of pollution.

Romania has not ratified the UNECE Convention on the Transboundary Effects of Industrial Accidents. In the case of the Baia Mare accident, the early-warning system implemented under the Convention on Cooperation for the Protection and Sustainable Use of the Danube River was used in order to notify the downstream authorities.

Transboundary river basins, Danube and the Black Sea

Romania lies in the lower Danube basin, and shares several other transboundary river basins up or downstream with Hungary, the Republic of Moldova, Ukraine and Yugoslavia. Romania is a Party to the UNECE Convention on the Protection and Use of Transboundary Waters and International Lakes, which is complemented by regional and bilateral agreements, as well as to the Convention on Cooperation for the Protection and Sustainable Use of the Danube River.

In 1992, the EU with PHARE/TACIS started the Environmental Programme for the Danube River Basin, according to which Romania developed a national plan. International working groups were set up to address several important issues, such as the transnational monitoring network or the accident emergency warning systems. These activities were continued in the framework of the International Commission for the Protection of the Danube River after the entry into force of the Danube River Protection Convention. Complementary to the Environmental Programme, the UNDP-GEF-funded Danube Pollution Reduction Programme was implemented.

The Strategic Action Plan for the Danube is coordinated by the International Commission for the Protection of the Danube River. Romania adopted a national strategic action plan for the protection of the Danube River. Romania also intends to transpose and implement the new EU Water Framework Directive and its daughter directives (on urban waste water, nitrates, dangerous substances, etc.) into national law.

Based on the integrated river basin management approach, the Water Framework Directive requires the establishment of river basin districts and river basin management plans. As for transboundary river basins, the Water Framework Directive allows the establishment of international river basin management plans.

Therefore, within the framework of cooperation of the International Commission for the Protection of the Danube River, Romania supports the implementation of the integrated river basin management approach for the Danube river basin in accordance with the Directive.

Romania has signed bilateral agreements with its neighbours Hungary, Ukraine and Yugoslavia on cross-border water management, which mainly address hydro-technical issues. The national water company, Apele Romane, has signed a memorandum with its counterpart in the Republic of Moldova concerning the Prut River. A hydro-technical agreement is in preparation. Some hydro-technical projects are co-funded through grants from the PHARE-Cross Border Cooperation programme, such as in the Cris, Tisza, Tur, and Barcau river basins. In 1986, a convention concerning protection of the Tisza River was concluded, but it never became operational and is now considered obsolete. The Water Framework Directive will require Romania to establish international river basin management plans for transboundary river basins.

Romania is a Party to the Bucharest Convention on the Protection of the Black Sea against Pollution, which entered into force in 1994. In the framework of the GEF-funded Black Sea Environmental Programme, the riparian States adopted the Strategic Action Plan for the Protection of the Black Sea in 1996. The International Commission for the Protection of the Black Sea and its secretariat, which is to be established in Istanbul, Turkey (to replace the Programme Implementation Unit), are still without sustainable funding.

Following the Strategic Action Plan, each of the six participating riparian countries hosts an activity centre relating to different activities (e.g. emergency response, pollution monitoring, protection of biodiversity, integrated coastal zone management). The Romanian National Marine Research Institute in Constanta was designated to be the Activity Centre for fisheries. Consistent with the Strategic Action Plan for the Protection of the Black Sea, Romania adopted a national action plan for the protection of the Black Sea.

To address the problem of eutrophication in the Black Sea, two GEF-UNDP project proposals on nutrient reduction measures (for the Danube and Black Sea basins) are pending. GEF-World Bank is currently supporting an agricultural pollution control project (total value US$ 8.4 million) in the area of Calarasi, to reduce nitrate inputs into the Danube and the Black Sea.

Transboundary air pollution

Romania ratified the UNECE Convention on Long-range Transboundary Air Pollution in 1991. Furthermore, Romania has signed the Protocols (i) on Heavy Metals, (ii) on Persistent Organic Pollutants, and (iii) to Abate Acidification, Eutrophication and Ground-level Ozone, which have not yet entered into force. Romania did not sign the Protocols (i) on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, (ii) concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes, or (iii) concerning the Control of Emissions of Volatile Organic Compounds or Their Transboundary Fluxes.

For air quality, Romania drew up an approximation strategy to EU laws, with the support of the Danish cooperation agency, DANIDA. The implementation of relevant EU norms is planned as a mid-term objective to be achieved by 2015. A transboundary project is currently being implemented together with Bulgaria by the MWEP with PHARE-Cross-Border Cooperation support to set up a joint air quality monitoring system in four towns in Romania and Bulgaria.

Environmental impact assessment and public participation

Romania signed the UNECE Convention on Environmental Impact Assessment in a Transboundary Context in 1991. The law on the ratification of the Convention was submitted to Parliament and is currently awaiting approval by the Senate. Secondary legislation or regulations will be necessary to implement the Convention, which MWEP plans to do through ministerial order. Romania plans to amend the Law on Environmental Protection (137/1995) in order to transpose the requirements of the EU Council Directive on the assessment of the effects of certain public and private projects on the environment.

In 2000, Romania ratified the UNECE Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. According to the European Commission, additional secondary legislation is needed to ensure implementation of these provisions. Non-governmental organizations are asking for better access to information and for

more consultation in inter-ministerial working groups, such as the one for NEAP coordination or EU approximation. (See Chapter 4.)

On 9 October 2000, Romania signed a bilateral agreement with the European Environment Agency (EEA) to participate in its activities until full accession. Romania is paying a financial contribution to EEA, which is being subsidized by PHARE for the first three years.

Other bilateral cooperation agreements

In 2000, Romania ratified a bilateral agreement concluded in 1997 with Hungary on cooperation in environmental protection, concerning, for instance, the exchange of information, cross-border monitoring and joint projects. In 1999, another agreement on forestry was concluded. An agreement on cooperation on environmental protection was already signed with Bulgaria in 1991. The MWEP has signed a general arrangement on ministerial cooperation on the environment with its counterpart in the Republic of Moldova.

5.4 Main international donors and partners

European Union

The oldest pre-accession programme, PHARE, has been of major importance for Romania in the past few years. PHARE is still gaining importance and between 1998 and 2000 the MWEP implemented projects co-funded by PHARE-Environment (total budget € 12 million, i.e. US$ 10.8 million), PHARE-Cross-Border Cooperation (total budget € 10 million, i.e. US$ 9.2 million) and PHARE Multi-Country Programme (total budget € 20 million, i.e. US$ 18 million) (Table 3.3, Chapter 3). Within PHARE-Environment, there is a component for strengthening the capacity of the MWEP. As part of this cooperation, two "twinning projects" are being implemented jointly with France (water quality) and Germany (waste management).

The new pre-accession programme, the Instrument for Structural Policies for Pre-Accession (ISPA), is aimed at the development of transport and environmental protection infrastructure (waste, water and air infrastructure), in order to support the implementation of the relevant EU directives requiring large investments. For environmental infrastructure (waste water, waste management and air pollution), grants of € 120 million per year will be available for Romania, from 2000 until 2006. Grants of the same amount are available in the transport sector and will be managed by the Ministry of Transport.

Environmental projects concern urban and municipal infrastructure and must have a minimum value of € 5 million. Projects must be 25% co-financed by the municipalities or by other sources. The MWEP has set up a division for the coordination of ISPA, which is responsible for the technical aspects of ISPA. The Ministry of Finance coordinates the financial aspects. Up to now, the ISPA Environment Strategy has identified about 120 project proposals (70% for water, 25% for urban waste management and about 5% for air protection). An amount of 2% of the Romanian ISPA grant is provided as technical assistance to municipalities to develop projects, applications and tendering documentation.

Seven projects involving the towns of Piatra Neamt (solid waste), Constanta (waste-water), Iasi (waste water), Craiova (waste-water), the Jiu valley (waste-water), Arad (waste management) and Braila, totalling € 306.8 million have already been approved by the ISPA management committee and will be co-financed by ISPA. Further projects are in the pipeline.

The EU Special Accession Programme for Agriculture and Rural Development (SAPARD) aims to help solve problems of structural adjustment in the agricultural sector and to implement the EU body of law concerning the Common Agricultural Policies. It will run until 2006. On the Romanian side, SAPARD will be managed by an independent SAPARD implementing agency, which has been created within the Ministry of Agriculture.

For the first year, grants totalling € 153 million (US$ 166 million) will be available for Romania. The MWEP will be responsible for issuing environmental agreements or permits for all projects.

Romania is participating in LIFE-Nature and LIFE-Environment programmes in their third phase (2000-2004). 19 projects for LIFE-nature and 37 for LIFE-environment have been submitted up to the autumn of 2000 and are assessed by Romanian and European Commission representatives. In the period from 1998 to 2000, the MWEP managed LIFE-supported projects for a total value of approximately € 4 million.

All the above-mentioned community accession programmes usually require co-financing from the beneficiary of a minimum 25% of the total value (under PHARE of total investments). Some beneficiaries, such as the municipalities, as far as ISPA is concerned, are reported to require further assistance in the drafting of these co-financing agreements, which are becoming increasingly complicated, in particular when involving partners in the private sector.

International Financing and other Institutions

The European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) were identified by the MWEP as suitable partners for providing loans for co-financing under European Union programmes, in particular ISPA. EIB requires (State) guarantees for loans. The World Bank is not in a position to provide loans to municipalities.

So far, the World Bank has not provided any major loans for environmental protection projects in Romania, but some large industrial projects do include environmental protection aspects, such as the rehabilitation of the petroleum industries, the rehabilitation of the power sector, and the restructuring of the mining sector (see Box 10.5).

In cooperation with the MWEP, the World Bank has been implementing three important projects with GEF grants for the conservation of nature and of biological diversity. The recent GEF-World Bank granted project on agricultural pollution control is in its preliminary stage, totalling US$ 0.3 million. The total value will be between US$ 12 and 15 million.

The Council of Europe Development Bank recently provided a loan for the construction of flood prevention infrastructure and the rehabilitation of flood-damaged infrastructure.

Global Environment Facility

Besides the funds provided by the European Union, the Global Environment Facility (GEF) is a major international donor providing grants to Romania. Several projects, mainly in the focal areas of biodiversity and international waters, have been implemented through UNDP and the World Bank. In the period from 1998 to 2000, the MWEP managed GEF-supported projects of a total value of about US$ 15 million.

Stability Pact

Romania participates in the Stability Pact for South Eastern Europe, which, under its Working Table II (economic reconstruction, development and cooperation), also addresses the subject of environmental protection. A project portfolio was submitted by the MWEP, but, so far, no project has been approved or implemented.

USAID

ECOLINKS, an initiative funded by USAID, is offering small grants to private companies and municipalities. REC is currently managing and implementing the ECOLINKS programme.

The programme is aimed at establishing partnerships with businesses or municipalities in the United States. An amount of US$ 25 million has been made available for seven central and east European countries, to be disbursed over five years. Several grants have already been given to Romanian beneficiaries.

United Nations Development Programme (UNDP)

UNDP is another partner in environmental protection. An ongoing project is the building of local capacities to implement the Local Agenda 21.

Bilateral donors

During the past five years, the MWEP has managed over 50 projects for a total value of some US$ 50 million. Individual countries provide aid and assistance for these projects. For example, Denmark has been an important bilateral donor for environmental protection. Projects funded by Denmark include the drawing up of two sectoral strategies for EU approximation on ‘air quality and climate change’ and ‘industrial pollution control and risk management’ and further assistance in the transposition and implementation of EU legislation on air pollution. Furthermore, two pilot projects on local air quality monitoring (€ 2 million) will start in 2001.

The Netherlands is another important partner. It offers assistance through the MATRA (i.e. Maatschappelijke Transformatie) Programme and PSO (Association for Personnel Services

Overseas) scheme. Based on an agreement between Romania and the United States, a USAID technical assistance programme is ongoing with the MWEP to promote modern and efficient legislation, and the future implementation of the law on the national environmental fund, which is in the process of being drafted. Japan (by providing an expert), Switzerland (US$ 6 million) and Norway are also involved in projects managed by the MWEP. Austria is cooperating with the Ozone Unit on projects concerning the protection of the ozone layer.

5.5 Conclusions and recommendations

Romania is a Party to almost all the environmental conventions currently in force at global and regional levels. Romania supports the further development of multilateral environmental agreements and participates in all major processes and international institutions. Romania is putting considerable effort into the full implementation of the provisions deriving from the international agreements to which it is a Party.

Romania is currently transposing and implementing EU environmental legislation. A report by the European Commission emphasizes the noticeable progress made by Romania in accession during the year 2000. Still, additional funds are urgently needed to accelerate implementation and enforcement.

Romania has not yet ratified the UNECE Convention on the Transboundary Effects of Industrial Accidents. Recent experiences (Baia Mare accidental spills and others) as well as other potential future accidents (see Chapter 10) prove the importance of the Convention, which would provide a framework for improving early warning and emergency planning, prevention and response.

Recommendation 5.1:
Romania should accede to the UNECE Convention on the Transboundary Effects of Industrial Accidents. Romania should strengthen its capacity for early warning and emergency planning, prevention and response in cooperation with international organizations, including the European Commission, the UNECE secretariat, the United Nations Development Programme, the United Nations Environment Programme's Regional Office for Europe and its Division of Technology, Industry and Economics, and the International Commission for the Protection of the Danube River.

Romania has not acceded to all the protocols to the Convention on Long-range Transboundary Air Pollution, concluded in the framework of UNECE.

Recommendation 5.2:
Romania should ratify and implement the three Protocols to the UNECE Convention on Long-range Transboundary Air Pollution that it has signed and ratify the EMEP Protocol.

The implementation of the EU Water Framework Directive will require Romania to establish river basin management plans for river basin districts. The Directive offers the possibility of establishing international river basin management plans for transboundary rivers with the countries involved. Such plans, e.g. regarding the Tisza basin, would complement a future international river basin management plan for the Danube as "sub-basin" plans.

Recommendation 5.3:
The Ministry of Waters and Environmental Protection should cooperate in establishing international river basin management plans for transboundary rivers following the provisions of the EU Water Framework Directive. These plans for "sub-basins" should be complementary to the future international river basin management plan for the Danube (see Recommendation 7.3).

The accident in Baia Mare emphasized that water is a common asset shared by various countries and that problems in one of them concern all. Improving Danube water quality in a country will benefit that country's population and also all the other riparian countries. Meeting the objectives of the Joint Action Programme for the Danube River Basin will fundamentally improve the quality of Romania's surface water resources, as will the implementation of the recommendations of the Baia Mare Task Force.

Recommendation 5.4:
The Ministry of Waters and Environmental Protection in cooperation with the Ministry of Foreign Affairs should promote the active implementation of the partnership among all riparian States that are Parties to the Convention on Cooperation for the Protection and Sustainable Use of the Danube River through the Joint Action Programme for the Danube River Basin, January 2001-December 2005.

Recommendation 5.5:
The Ministry of Waters and Environmental Protection together with the Ministry of Industry and Mineral Resources should make all efforts to duly implement the recommendations contained in the report of the International Task Force for Assessing the Baia Mare Accident. The Ministries should also find ways to make industry assume their respective responsibilities.

The MWEP is developing and implementing a number of projects in cooperation with international partners. New EU accession grant programmes will provide for a further, considerable increase in funds to be invested in the environment. An increasing number of projects will need to be implemented at national, regional and local levels. Therefore, the MWEP and its Division for International Relations and European Integration need to be strengthened, as concerns the size of staff, equipment and the financial resources.

The NEAP proved itself to be the central tool to select, analyse and discuss projects, including those involving international or foreign donors. The NEAP Committee and inter-ministerial working groups play a very important role in inter-ministerial coordination during the entire implementation cycle of the projects. Coordination within the NEAP Committee and working groups could be improved, by including all projects and by approving concrete selection criteria, in addition to the more general provisions of the Environmental Protection Strategy.

Most of the donors require the co-financing of projects by national or other sources, including the increasingly large ISPA grants. The MWEP could develop a co-financing strategy, involving other ministries and the future environmental fund. The cooperation should aim at improving the capacity to draft, negotiate and implement co-financing agreements.

Several donors have identified a need for increased coordination among donors. This need could be met by a strategy to coordinate the approaching of donors by the different departments of the MWEP and other ministries. Communication with the Ministry of Foreign Affairs could be improved by a periodic exchange of information on sources of funds offered by international organizations.

Recommendation 5.6:
The Ministry of Waters and Environmental Protection should develop a strategy for strengthening the capacity to draft, negotiate and implement co-financing agreements for environmental projects. A strategy for coordinating the approach to donors and for information exchange should also be developed.

PART II: MANAGEMENT OF POLLUTION AND OF NATURAL RESOURCES

Chapter 6

AIR POLLUTION

6.1 State and determinants of air pollution

Air emissions

Since 1989 air emissions in Romania have dropped sharply. Emissions of the major common air pollutants (SO_x, NO_x, NH_3, PM, VOC) from stationary sources have decreased by about 40% and from mobile sources by about 20%. SO_x emissions from stationary sources have decreased by 32%, NO_x by 51%, CO by 23% (See Table 6.1). The main reason for this trend was the overall recession following the political changes in 1989, which resulted in a drop in industrial production (in 1999 GDP was only 76% of that in 1989; see Table I.3 Introduction). In Romania air emission data are calculated from various national sources, such as the local EPIs and the National Commission for Statistics. The present status of the monitoring network does not provide for an accurate description of air emissions.

Table 6.1: Trends in anthropogenic emissions of selected pollutants, 1989-1997

*1000 t**

		1989	1990	1991	1992	1993	1994	1995	1996	1997
SO_x	**Total**	**1 517**	**1 311**	**1 041**	**951**	**928**	**912**	**932**	**751**	**898**
	Stationary sources	…	1 273.0	1 006.0	919.3	899.7	881.0	899.0	724.0	866.2
	Mobile sources	…	38.0	35.0	31.7	28.3	31.0	33.0	27.0	31.8
NO_x	**Total**	**579**	**546**	**464**	**357**	**348**	**349**	**420**	**362**	**330**
	Stationary sources	…	310.0	238.0	183.0	245.0	246.0	194.0	167.0	153.0
	Mobile sources	…	236.0	226.0	174.0	103.0	103.0	226.0	195.0	177.0
NH_3	**Total**	**341**	**300**	**267**	**255**	**223**	**221**	**217**	**214**	**211**
	Stationary sources	…	300.0	267.0	255.0	222.9	220.9	216.9	213.9	210.9
	Mobile sources	…	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
NMVOC	**Total**	**656**	**616**	**522**	**497**	**502**	**505**	**491**	**513**	**439**
	Stationary sources	…	528.0	451.0	430.0	434.0	437.0	424.0	443.0	379.0
	Mobile sources	…	88.0	71.0	67.0	68.0	68.0	67.0	70.0	60.0
CO	**Total**	**3 314**	**3 186**	**2 695**	**2 506**	**2 434**	**2 395**	**2 440**	**2 645**	**2 480**
	Stationary sources	…	2 633.0	2 250.0	2 092.0	2 023.0	1 960.0	1 999.0	2 167.0	2 032.0
	Mobile sources	…	553.0	445.0	414.0	411.0	435.0	441.0	478.0	448.0
CH_4	**Total**	**2 266**	**1 864**	**1 634**	**1 462**	**1 462**	**1 432**	**1 439**	**1 427**	**1 453**
	Stationary sources	…	1 862.5	1 632.7	1 460.8	1 462.8	1 430.8	1 437.5	1 425.5	1 451.5
	Mobile sources	…	1.5	1.3	1.2	1.2	1.2	1.5	1.5	1.5
CO_2 *	**Total**	**198**	**171**	**141**	**126**	**123**	**121**	**127**	**111**	**105**
	Stationary sources	…	160.5	132.6	118.5	115.5	113.6	119.4	104.4	98.7
	Mobile sources	…	10.5	8.4	7.5	7.5	7.4	7.6	6.6	6.3
Pb	**Total**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**
	Stationary sources	…	…	…	…	…	…	…	…	…
	Mobile sources	0.40	0.30	0.36	0.38	0.36	0.37	0.34	0.35	0.33

Source: The National Research Development Institute for Environmental Protection (ICIM), Romania.

* CO_2 in milions of tons per year

Apart from the lower energy demand and the overall drop in production, some of the emissions fell also due to abatement measures, which were introduced step by step. The sulphur content of liquid fuels was reduced from about 4% in the 1980s to the present 1-1.5%. In large cities so-called city fuel with a 0.5% sulphur content is used. The ongoing modernization and restructuring of the energy sector also had a positive effect (see Chapter 13). It is estimated that the increased efficiency of electrostatic precipitators reduced dust emissions by about 60%.

At present, the monitoring network and measuring devices do not give enough information to have a clear picture of the other industrial air pollutants. Given the structure of Romania's industrial sector (preponderance of heavy industry) and the prevailing old production equipment and technology, it can be assumed that ferrous and non-ferrous metallurgy emits high levels of heavy metals. At the same time, large emissions of organic matter are likely to come from the extraction and processing of crude oil, the chemical industry and the mining-metallurgy sector, where sinter plants in particular are one of the most important sources of persistent organic pollutants (dioxins, PCBs and PAHs). Though not measured, limited quantities of similar substances might be released into the air from uncontrolled open-air burning at dumping sites.

Lead emissions from mobile sources decreased by 17% due to the step-by-step introduction of unleaded petrol over the 1989-1997 period. However, limits of lead in the air, established by the World Health Organization, have been exceeded in various residential areas (see Chapter 14). Emissions of greenhouse gases decreased on average by 37% during the 1989-1997 period (Table 6.1).

As a Party to the Montreal Protocol on Substances that Deplete the Ozone Layer, Romania is bound to phase out both CFC and HCFC consumption. Romania has cut its annual consumption of ozone-depleting substances (ODS) to 1,069 tons.

Romania's air emissions per capita are more or less comparable with those of other countries in transition (Figure 6.1). Its SO_x emissions per capita are above the EU-15 average. Its CO_2 and NO_x emissions per capita are about 50% of the EU-15 average.

In a transboundary context, 54% of sulphur deposition, 70% of oxidized nitrogen and 36% of reduced nitrogen compound deposition are from abroad, mainly from Bulgaria, Hungary and Yugoslavia. According to EMEP, Romania is a net exporter of oxidized sulphur and reduced nitrogen emissions and a net importer of oxidized nitrogen emissions (Table 6.2).

Sectoral pressures and underlying factors

Because of its mineral resources and primary energy sources (Chapters 10 and 13), Romania's economy is based mainly on heavy industry. Romania extracts and processes metals. Obsolete technologies and equipment dating back to the period before 1990 are used.

In 1995, the energy sector contributed 48% to total air emissions, non-industrial combustion 26%, combustion in the transformation industry 12%, and the transport sector (including other mobile sources) 11%. In 1999, the energy sector contributed 46%, non-industrial combustion 25%, combustion in the transformation industries 11%, and the transport sector (including other mobile sources) almost 13% (Figures 6.2 and 6.3).

The average passenger car is about 14 years old, and many cars on Romania's roads are even older (Chapter 12). The car stock increased by 79% in 1996 as compared with 1990. The maximum lead content of leaded petrol was 0.4 g/litre from 1990 to 1995 and 0.32g/litre from 1995. However, as the total volume of traffic has increased, so have fuel consumption and traffic emissions. A decrease in lead emissions from transport may be expected after the total phasing-out of leaded petrol planned for 2005 (Act 489/1998), and the increased use of cars equipped with catalytic converters. Romania has a large car-manufacturing sector and most of the cars sold there are made in the country. There are few models available at present that are designed to run on unleaded petrol. Significant investment is required to bring production into line with that in more advanced car-producing nations.

Romania's main air-polluting industry is still power and heat production, even if its SO_2 emissions decreased by 32% and its NO_x emissions by 48% between 1990 and 1997. Energy production decreased by about 27% during that same period and total energy consumption by 6% (in industry by 48%). In 1998, 35% of electricity was produced by hydropower, 30% by coal (hard coal and lignite), 21% by oil and gas and 10% by nuclear power. In

the future air pollution from this sector may further decrease, as the capacity of nuclear power should be doubled in 2005 (see Chapter 13). Although no construction of desulphurization units is planned, commitments made to the World Bank require that the sulphur content in fuel oils should be reduced by 0.5% a year from the initial 4-5% in 1994. For Bucharest and Constanta a special regulation prescribes the use of fuel oil with a sulphur content of less than 1%.

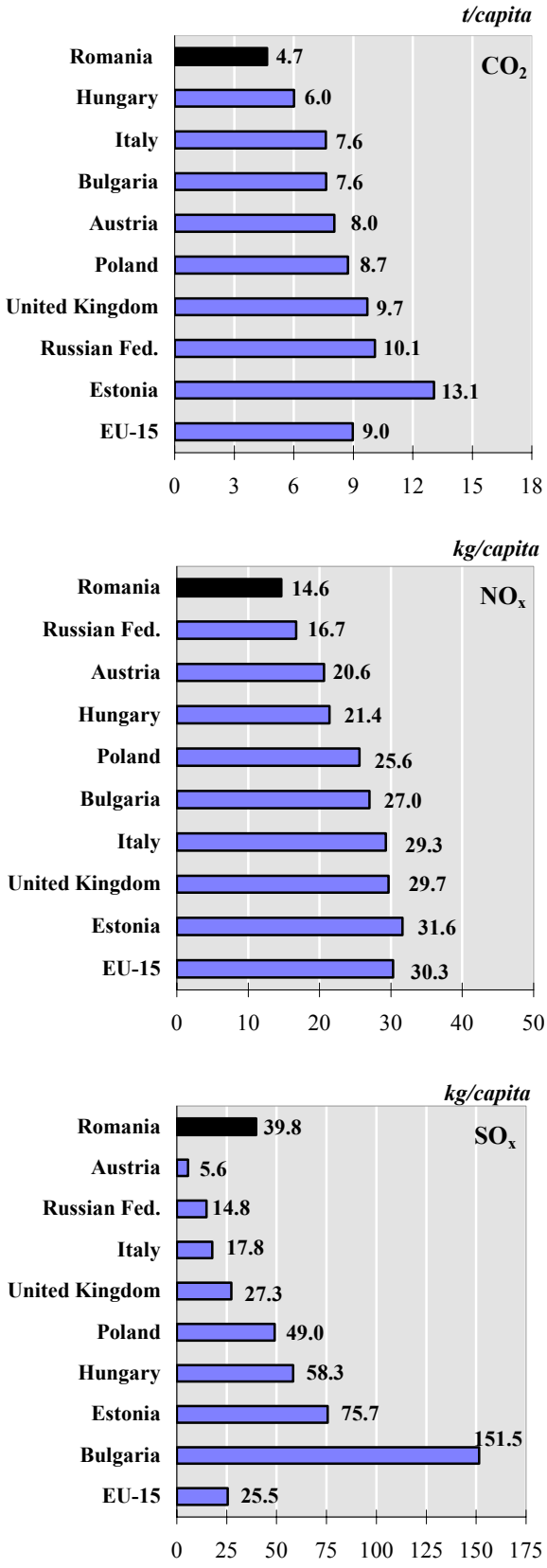
The planned implementation of EU fuel-quality directives will imply further emission reductions due to the use of liquid fuels in transport and power production.

Significant environmental pressure originates in the mining-metallurgy sector. Non-ferrous metallurgy located in Baia Mare, Copsa Mica and Zlatna produces lead, copper, zinc and aluminium. The production volumes of these ores fluctuated over the past 10 years according to the economic situation (Table 10.1). Heavy metals, sulphur dioxide and solid particles as well as organic matter are the main pollutants from this sector. Ferrous metallurgy is located mainly in Hundeoara, Calan, and Galati. It is responsible for large emissions of heavy metals, CO, solid particles, SO_2 and organic matter (Chapter 10).

The chemical and petrochemical industry, located in Ramnicu Valcea, Onesti, Savinesti, Stolnicei, Cluj and Ploiesti, pollutes the vicinity of the plants mainly with hydrochloric acid, chlorine, and volatile organic compounds. Chemical fertilizer production in Targu Mures emits mainly ammonia and NO_x. The pulp and paper industry, together with synthetic fibre production, located in Braila, Suceava, Dej, Savinesti and Borzesti, pollutes with sulphur dioxide, carbon bisulphate, hydrogen sulphide and mercaptans. Several cement plants emit solid particles, NO_x and CO. To be competitive on the free market, the large investments in new technologies would be needed in these sectors, and would simultaneously mitigate the environmental impact of cement plants.

Environmental pressure comes also from the waste management sector. There are hardly any waste incineration plants, except for some small hospital waste incinerators. The usual waste management method is dumping. However, waste at dumping sites is often burned in the open air to reduce its volume. As the process is totally uncontrolled, large quantities of CO and highly toxic organic substances, such as polyaromatic hydrocarbons and dioxins, are emitted into the atmosphere.

Figure 6.1: Emissions of CO2, NOx and SOx, 1997-1998



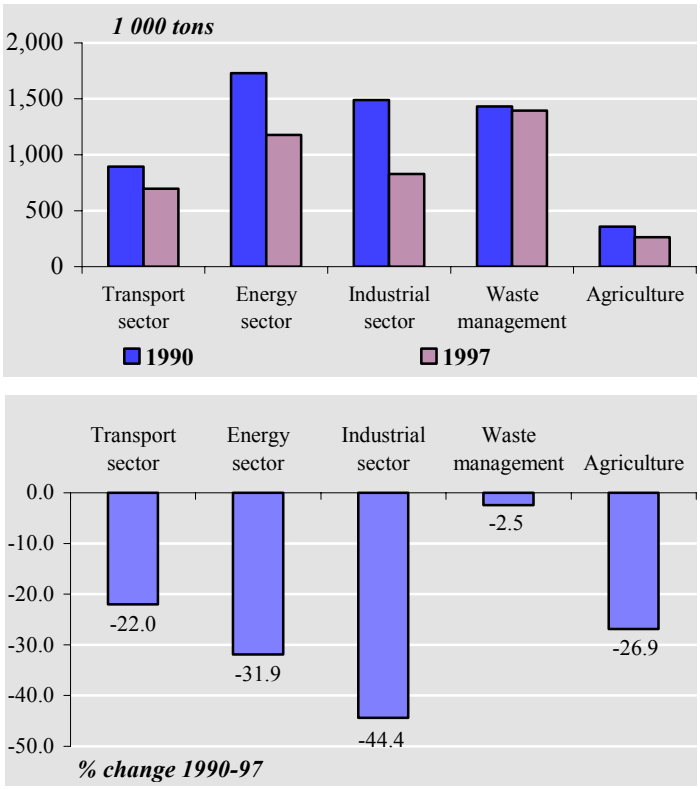
Sources: EMEP; OECD; ICIM.

Table 6.2: Transboundary import/export budgets of air pollutants, 1998

	Oxidized S	Oxidized N	Reduced N
Export mass *(100 t)*	2 768	661	825
Exported % of emissions	61	68	45
Import mass *(100 t)*	2 102	721	568
Imported % of deposition	54	70	36
Net export	666	-60	257

Source: EMEP/MSC-West Note 2000.

Figure 6.2: Emissions* by sector, 1990 and 1997



Source: The National Research Development Institute for Environmental Protection (ICIM), Romania, 1999.

* Total emissions include SO_x, NO_x, NH_3, NMVOC and CO. CO_2 is not included.

Ambient air quality

Despite the fact that emissions have decreased in the past few years, air quality in the most polluted regions has not notably improved. Air pollution trends in the highly industrialized urban areas (Table 6.3) have shown a slight decrease in the breaching of maximum admissible concentrations (MACs) during recent years. However, MACs are still exceeded in industrial regions all over Romania.

The four basic pollutants (SO_2, NO_2, ammonia and suspended particles) are monitored, as are some site-specific pollutants, such as heavy metals, HF, HCl, NH_3, arsine, phenol, formaldehyde and

chlorine. There are no consistent ground-level ozone data available at present, nor information on PM10 or PM2.5 (see Chapter 14).

Air quality is assessed according to Romanian national standard STAS 12574/87, setting MACs for 28 pollutants, together with the respective analytical standards. 1999 monitoring data describes the air quality in Romania as follows:

- The sulphur dioxide 24-hour mean concentration exceeded the MAC/24 (0.25 mg/m^3) in Zlatna 7.2 times with a frequency of 30%, in Baia Mare 2.3 times with a frequency of 1.1% and in Copsa Mica 1.5 times with a frequency of 0.48%. Annual mean concentrations were in general under the annual MAC (0.06 mg/m^3). MACs were exceeded in Targoviste, Craiova, Cluj and Zlatna. According to the State Environment Report 1999, the highest annual mean value (0.355 mg/m^3) was in Zlatna.

  The nitrogen dioxide 24-hour mean concentration exceeded the MAC/24 (0.1 mg/m^3) in Targu Mures 2.7 times with a frequency of 0.11%, in Savinesti 2.4 times with a frequency of 0.5%, in Craiova with a frequency of 2.8%, in Isalnita with a frequency of 0.37%, in Pitesti with a frequency of 0.21% and in Hundeoara with a frequency of 0.18%. Annual mean values were below the yearly MAC at most monitoring points, but not in Craiova, Isalnita, Focsani, Marasesti, Zalau and Cluj (See also Figure 14.4). For nitrogen dioxide, MAC breaches are caused mainly by road traffic, which has become more intense.

- The suspended particle concentration exceeded the MAC/24 in 34 localities. The highest values were registered in: Chiscadaga 4.4 times, Brasov 4.2 times, Baia Mare 3.8 times, Gheorgheni 3.6 times and Hundeoara 3.3 times. The frequency of violations was around 20% in Baia Mare, Brasov and Gheorgheni, around 60% in Targoviste and Arad and even 84% in Ramnicu Valcea. Fossil fuel combustion, metallurgy and cement production are the main contributors.

- The 24-hour mean concentration of ammonia exceeded the MAC/24 in 24 localities. The highest values were registered in Brasov (5.4 times with a frequency of 1.25%), Sendreni (3.7 times with a frequency of 0.7%) and Turnu Magurele (3.3 times with a frequency of 1.09%). Ammonia pollution is mainly due to the chemical industry and fertilizer production.

- Several site-specific pollutants, such as lead, cadmium, hydrogen sulphide hydrochloric acid, phenol, sulphates and aldehydes, are also monitored. The frequency of MAC/24 violations was registered for lead in Baia Mare 49%, Copsa Mica 74%, Medias 58% and Zlatna 59%. The MAC/24 for cadmium was breached with a frequency of 77% in Copsa Mica, 25% at Baia Mare and 63% at Medias.

- Air pollution 'hot spots' caused by various heavy industries, such as the petro-chemical, chemical fertilizer, non-ferrous and metallurgical industries, were identified in Copsa Mica, Baia Mare, Zlatna, Ploiesti, Onesti-Borzesti, Bacau, Suceava, Pitesti, Targu Mures, Turnu Magurele, Tulcea, Craiova-Isalnita, Brasov and Ramnicu Valcea.

6.2 Policy objectives and management practices

Objectives and legislation

The general legal provisions for air management are included in the 1995 Law on Environmental Protection. The Law on the Protection of Atmospheric Air, drafted by the inter-ministerial working groups, was approved as Urgent Ordinance No. 633/2000 and is now before Parliament for discussion. It complies with EU legislation and covers all air management aspects, including a national monitoring network. The other legal documents that directly or indirectly govern air management are:

- Standard 12574/1987 on air quality requirements in protected areas
- Ministerial Order No. 462/1993 on technical requirements for air protection and limits on polluting emissions from stationary sources
- Ministerial Order No. 125/1996 for the approval of regulation procedures and social and economic activities with an environmental impact
- Ministerial Order No. 756/1997 approving the Regulations governing the assessment of environmental pollution
- Ministerial Order No. 1032/1997 approving the technical norms for environmental inspection
- Government Decision No. 172/1997 approving the national register of chemicals and

Table 6.3: Air pollution trends in the highly industrialized urban areas

Locality	Year	Pollutant	Annual average concentration	Maximum 24-hours concentrations	24-hour MAC violations
			(mg/m^3)	*(mg/m^3)*	*(%)*
Baia Mare	**1992**	SO_2	0.20400	5.18000	31.10
	1994		0.26000	5.03000	21.20
	1998		0.14000	2.32000	4.00
	1992	Lead	0.01000	0.05400	94.60
	1994		0.00469	0.03430	78.82
	1998		0.00370	0.04540	52.04
	1992	Cadmium	0.00005	0.00100	58.60
	1994		0.00003	0.00120	44.80
	1998		0.00004	0.00079	32.21
Hunedoara	**1992**	Suspended particles	0.28000	2.50000	84.00
	1994		0.16000	0.55500	40.70
	1998		0.19000	1.16000	7.63
Copsa Mica	**1992**	SO_2	0.71000	1.25000	11.30
	1994		0.03000	1.09000	1.20
	1998		…	…	not exceeded
	1992	Lead	0.06800	5.15300	60.50
	1994		0.00170	0.02920	53.20
	1998		0.00350	0.04670	73.91
	1992	Cadmium	0.00020	0.04300	50.30
	1994		0.00005	0.00081	37.10
	1998		0.00020	0.00130	75.91
Bacau	**1992**	NH_3	0.05000	0.31000	19.00
	1994		0.07410	0.61000	20.40
	1998		0.04000	0.10600	0.50
Tr. Magurele	**1992**	NH_3	0.08400	0.52000	27.50
	1994		0.02800	0.09400	not exceeded
	1998		…	…	not exceeded
Zlatna	**1995**	SO_2	0.22000	…	n.a.
	1998		0.14000	1.33000	10.73
	1999		0.35500	…	30.38
Bucuresti	**1992**	NH_3	0.03100	0.67200	16.80
	1994		0.03500	0.43600	11.60
	1998		…	…	…
	1994	NO_2	0.03200	0.13800	12.30
	1998		…	…	…
	1992	Suspended particles	0.05800	0.26300	29.30
	1994		0.08400	0.31200	35.70
	1999		0.07370	…	n.a.

Sources: Environmental statistic yearbook 1999; Environment protection strategy 1996; Sectoral aproximation strategy for air and climate change; Institute for public health - Bucharest

MAC: maximum admissible concentration
n.a.: not available

potentially dangerous substances and its regulation
- Ministerial Order No. 184/1997 approving the procedures for environmental auditing
- Government Order No. 30/1998 on standardization activities in Romania and the accreditation of certifying bodies and laboratories
- Government Decision No. 457/1998 on the Pb content of fuels
- Ministerial Order No. 524/2000 on a national emission inventory
- Law No. 73/2000 on the Environment Fund
- Ministerial Orders on the technical standards of motor vehicles
- Standards for the sulphur content of liquid fuels.

Draft fuel quality regulations are also prepared by the MIR. However, most of the different regulations and standards needed for the enforcement of the new Law on the Protection of Atmospheric Air are still missing.

In view of EU accession, air management issues are the subjects of two sectoral approximation strategies:

- Sectoral Approximation Strategy on Air Pollution and Climate Change in Romania (1999). It covers the transposition of the Air Quality Framework Directive and its daughter directives; several vehicle-type approval directives and fuel quality directives, and the Climate Change Directive. It has been developed in partnership by the Inter-ministerial Working Group on Air and Climate Change and a team of EU consultants sponsored by the Danish Environmental Protection Agency. Representatives of ICIM, INMH, MoH, ISP(B), MIR and MPWTH/RAR participated in this working group, created by MWEP.
- Sectoral Approximation Strategy on Industrial Pollution Control (1999) It covers the transposition of the directives on integrated pollution prevention and control, air pollution from industrial plants, limitation of emissions from large combustion plants, limitation of emissions of volatile organic compounds from certain activities and installations, control of major accident hazards involving dangerous substances, voluntary eco-management and audit schemes, eco-labelling, pollution caused by certain dangerous substances discharged into the aquatic environment, air pollution from the incineration of municipal waste and the incineration of hazardous waste. The Strategy was drawn up by experts from the Inter-ministerial Working Group on Industrial Pollution Control, comprising MWEP, ICIM, MoH and MIR representatives, assisted by Danish consultants sponsored by Denmark's Environmental Protection Agency.

As regards international obligations, Romania has been a Party to the United Nations Framework Convention on Climate Change since 1994 and ratified the Kyoto Protocol in 2001 as an annex 1 country. Romania is committed to reducing its greenhouse-gas emissions by 8% in the period 2008-2012, as compared to the base year 1989. The greenhouse-gas mitigation strategy is based mainly on abatement measures, joint implementation, an energy efficiency policy, energy savings and the use of renewable energy sources (more details in Chapter 5).

Romania ratified the Convention for the Protection of the Ozone Layer together with the Montreal Protocol and the London amendment (Law No. 84/1993, Government Order No. 89/1999, Government Order No. 24/2000) and committed itself to cutting its ODS emissions to zero between 2005 and 2015 (Chapter 5).

Romania also ratified the UN/ECE Convention on Long-range Transboundary Air Pollution in 1991 and three of its protocols (see Chapter 5). However, it does not intend to ratify the other protocols in the near future as information on the baseline years is insufficient and the requirements would be difficult to fulfil since all the scarce resources are devoted rather to EU accession tasks.

Institutional framework

At present, the following institutions have air quality management tasks and responsibilities:

- The Ministry of Waters and Environmental Protection (MWEP) develops air protection strategy, policy and legal instruments; is responsible for the licensing system and EIA; supervises the implementing institutions; is responsible for monitoring and reporting on a national level; provides ecological analysis for projects of national importance; organizes ecological training and education; has responsibility for international treaties and their implementation and translation into the national

policy and legal system; supervises the inspection of compliance by the pollution sources with air protection legislation; supervises the implementation of protective measures and emission limits as specified in the compliance schedule;

- The National Research Development Institute for Environmental Protection (ICIM) coordinates the monitoring activities of 42 local EPIs; develops and updates air quality modelling methodology, and validates, processes and interprets data; coordinates emissions inventory activities and manages the national database; provides technical support to the MWEP;
- The 42 local Environmental Protection Inspectorates (EPIs) enforce environmental legislation at local level; issue permits to industry; approve EIAs and environmental diagnoses; negotiate compliance schedules; conduct State inspection at local level and supervise compliance with environmental protection legislation and the permit conditions and report violations; carry out environmental monitoring; cooperate with citizens and environmental NGOs;
- The National Company of Hydrology and Meteorology provides information on the ozone layer and climatic data, as well as prognosis and planning information regarding the use of (ground)water;
- The Ministry of Health and the Family (MoH) sets air quality standards in residential areas on the basis of health effects and participates in the development of air protection legislation;
- The Institute of Public Health (ISP) coordinates air quality monitoring in terms of health effects on behalf of the Ministry of Health;
- The 42 local offices of the Ministry of Health are responsible for monitoring air quality in residential areas according to their responsibilities regarding health effects;
- The Ministry of Industry and Mineral Resources (MIR) is responsible for policy and legislation on fuel quality and has a specific role in the work of the MWEP on industrial pollution;
- The Ministry of Public Works, Transport and Housing (MPWTH) is responsible for the development of policy and legislation on transport-related emissions to air and records data on emissions to air from vehicles.

Each of the ministries also has an environmental protection department and environmental legislation is usually prepared in inter-ministerial working groups under the MWEP. Other ministries also prepare some of the environment-related legal documents, e.g. MIR the fuel quality regulations, or MPWTH the motor vehicle regulations. There is no special air management department in the MWEP. Air management issues are dealt with in the division for ecological control and monitoring under the general directorate for environmental protection.

Local EPIs play a key role in the enforcement of legislation on air in particular. ICIM provides regular monitoring services and methodological guidance to local EPIs. It also gives technical support to the MWEP, which does not have enough air pollution experts. Although the regular tasks of the different institutions seem to be covered sufficiently, major investments and the implementation of new tasks are often financed within the framework of projects with foreign donors.

Air quality management and monitoring

MACs are set for 28 pollutants in standard 12574/1987 on air quality requirements in protected areas. For each of the pollutants analytical standards are set at the same time. Wet manual methods, gravimetry, spectrophotometry and atomic absorption spectrometry are used. Most of the pollutants have both 30-minute MACs and 24-hour MACs. Only SO_2, NO_2 and suspended particles have annual MAC limits too. These limits are comparable with those in the EU, but are usually slightly less strict (Table 6.4). In 2001, the standards are expected to be raised to the EU level.

There are two air quality monitoring networks in Romania: the *community air pollution network* under MoH and the *national air quality monitoring network* under MWEP.

- The MoH network started in 1973 and is coordinated by the Institute of Public Health in Bucharest. In 1989, part of this network became the basis for the new *national air quality monitoring network* created under MWEP, which started regular monitoring in 1991. At the same time the personnel of local EPIs was trained to use the same analytical methods and sampling procedures. Therefore, the sampling points of the two networks do not overlap and their methods are consistent.

Table 6.4: Comparison of selected Romanian air quality standards, WHO guiding values and EU standards

Substance	Romania MAC mg/m³		WHO guiding value / averaging time	EU standards / averaging time	
	30 min	*24h*		Present	According to IPPC Directive a/
Carbon monoxide	6.00	2.00	60 mg/m³, 30min 10 mg/m³, 8h		
Sulphur dioxide	0.75	0.25	0.5 mg/m³, 10 min 0.125 mg/m³, 24 h	0.08 mg/m³, annual, median value if BS > 40 and b/ 0.12 mg/m³, annual, median value if BS > 40	0.125 mg/m³, 24 h, exceeded not more than 3 times annually to protect human health; c/ 0.020 mg/m³, annual and in winter to protect ecosystems d/
	annual: 0.06		0.05 mg/m³, annual		
Nitrogen dioxide	0.300	0.10	0.2 mg/m³, 1 h 0.04 mg/m³, annual	0.2 mg/m³, annual, exceeded not more than 2% time	0.2 mg/m³, 1 h, exceeded not more than 8 times annually (50% margin of tolerance) e/ 0.04 mg/m³, annual, (50% of tolerance) both to protect human health; 0.03 mg/m³, annual, as $NO + NO_2$ to protect vegetation
	annual: 0.03				
Total suspended particles	0.500	0.15	0.06-0.09 mg/m²	0.08 mg/m³, annual median value 0.13 mg/m³, winter median value 0.25 mg/m³, maximum value not to be exceeded more than 3 times annually	0.05 mg/m³, 24 h, (50% margin of tolerance to protect human health) 0.03 mg/m³, annual, (50% margin of tolerance to protect human health)
	annual: 0.075				
Lead		0.0007	0.0005 mg/m³, annual	0.0002 mg/m³, annual	0.0005 mg/m³, annual (100% margin of tolerance)

Sources: STAS 12574-87; WHO Air Quality Guidelines for Europe and EU Directive 96/61 on IPPC.

MAC maximum admissible concentration

Notes:

a/ **IPPC**: Integrated Pollution Prevention and Control.
b/ **BS**: Black smoke.
c/ Attainment date: 01-01-2005.
d/ Attainment date: 2 years after entry into force of the IPPC Directive.
e/ Attainment date: 01-01-2010.

However, there are no inter-laboratory comparisons or common QA/QC procedures at present. Both networks are separately financed, organized and maintained. Annual national summaries are prepared separately, for the MWEP network by counties and for the MoH network by cities. In the year 2000, the MoH network comprised 51 sampling points. Four 24-hour samples are taken weekly. Suspended particles, SO_2, NO_x, NH_3, lead and formaldehyde are monitored. Some PM10 and PM2.5 data were obtained during the international 1995-1996 CESAR project (see more details in Chapter 14). However, CESAR lasted only one year.

- The MWEP network, coordinated by ICIM, follows a 1993-1994 master plan developed under PHARE. It includes four mountain background stations, 84 urban and urban-industrial stations, control/warning stations for accidental releases at industrial and nuclear facilities and five mobile stations (one of them belonging to the Bucharest municipality). Included in this are four transboundary stations along the Danube. The mountain background stations participate in the EMEP and Global Atmospheric Watch (GAW) networks and the transboundary stations participate in a joint Romanian-Bulgarian environmental monitoring programme along the Danube. However, most of the mobile stations (purchased mostly with foreign grants), equipped with continuous measurement devices, are not functional, due to a lack of funds for their operation, calibration and maintenance. Five new mobile monitoring stations were purchased recently and there are plans to purchase another five mobile monitoring stations, equipped to fulfil all EU air quality monitoring requirements. They should be used in the border regions.

In the MWEP network ambient concentrations of SO_2, NO_x, NH_3 and suspended particles are measured at the urban and urban-industrial stations. Additional site-specific pollutants are measured in industrial areas (HCl, phenols, aldehydes, Cl_2, H_2S, CS_2, F, H_2SO_4, Pb, Cd). O_3 measurements are not sufficiently representative due to problems with the analysers and their calibration. Also a manual non-specific method is used. The target sampling frequency is eight 30-minute samples per day and 30/31 24-hour samples per month. Due to limited resources the sampling frequency is typically half of this. Precipitation chemistry is measured weekly at about 100 locations, primarily at meteorological stations and also the mountain background stations. It includes pH, acidity/alkalinity and conductivity measurements as well as main anion and cation concentrations at the background stations. Thirty-three monitoring stations have been selected to take part in the European network EUROAIRNET, coordinated by the European Environment Agency.

None of the laboratories is internationally accredited at present; ICIM being under PHARE 1998 will be the reference laboratory by the end of 2001**.** However, the ICIM laboratory is organizing inter-laboratory calibration measurements for all local EPI laboratories on an annual basis, and is preparing to be accredited as a national reference laboratory according to ISO 17025.

Monitoring results are published regularly on local EPI levels and also on the national level in the form of a comprehensive information bulletin.

Management of emission sources

Ministerial Order No. 462/1993 is a comprehensive legal document, setting the technical conditions for the protection of the atmosphere and methodical norms for emission measurements. Emission limits, both general (for about 100 pollutants) and specific, are based on Best Available Technology (BAT) and are very stringent. In fact, this ambitious Ministerial Order is based on a Swiss legal document, which is more stringent than the European legislation. The implementation and enforcement of this law is difficult in the present situation: monitoring is not sufficient and the implementing regulations are not in place.

Local EPIs have the authority to issue environmental permits for all new and existing activities, except those listed in article 3.1.2. of Ministerial Order No. 125/1996, which come under the MWEP. The above institutions have the authority to suspend or review the environmental agreement and/or permit, when the situation requires it. The State inspectors from local EPI, certified by the MWEP, have the authority to make random inspections to verify compliance with the environmental permit and/or agreement under Ministerial Order No. 1035/1997.

Since 1995 existing plants must also have an operating permit, based on an EIA or environmental diagnosis. In the case of non-compliance, a so-called *compliance schedule* is

established. It describes the measures to be taken to gradually come into compliance, usually over five years. Even if emission limits are set, compliance is assessed by comparing ambient air concentrations in the vicinity of the plants with the MAC, rather than by comparing actual emissions with the emission limits. This is mainly due to the lack of stack-emission measurement data, in contrast to the relative availability of ambient air quality measurements. At present, only ICIM and 3 local EPIs are equipped to measure stack emissions. Operators of pollution sources are obliged to carry out self-monitoring. However, only the energy sector has three mobile units available for monitoring stack emissions. Calculation methods are used at most sources.

The national emission inventory is prepared by ICIM, using the CORINAIR methodology. According to Ministerial Order No. 524/2000, a national emission inventory system should be introduced throughout the country. Pilot projects have been set up in eight local EPIs with USAID financial assistance. They focused on capacity building in the use of CORINAIR and USEPA AP 42 (Compilation of Air Pollutant Emission Factors; USEPA Office of Air Quality Planning and Standards) methods, as well as the use of dispersion modelling. The inventory will be based on information from particular sources, summarized at local EPI levels and finally at the national level at ICIM.

Local EPIs are also responsible for the regular inspection of plants. When an installation has been inspected, an inspection report is prepared, describing its state, the level of investment in emission abatement equipment, and the compliance with the permit or compliance schedule. In the case of non-compliance, the authorities may require the introduction of some reparative measures, and inspectors check later on whether these were in fact introduced. However, enforcement is hampered by the fact that there are nearly no emission measurements or measuring equipment available. Thus, the inspectors do not have a basis for enforcing and fining. A plant is inspected at least once a year, depending on its size and importance.

Economic instruments and cleaner technologies

The *polluter pays principle* is being introduced step by step. At present, only non-compliance fees are paid for air pollution. There are plans to introduce emission fees, which would be paid into the newly created Environment Fund (more in Chapter 3).

Emission limits set in Ministerial Order No. 462/1993 are fully BAT-based, and therefore should, in principle, be an incentive to encourage the introduction of cleaner technologies into new or reconstructed enterprises. Existing sources had to comply with those limits in the year 2000. However, large investments in the general modernization of existing installations and procurement of cleaner technologies are inevitable to meet those limits. This process is hampered by a general lack of funds. Forthcoming privatization could promote this process, as only modern (at the same time usually cleaner) technologies will be able to ensure competitiveness on the international markets. A positive example is the introduction of cleaner technologies in the largest chemical factory *Oltchim* in Ramnicu Valcea.

On a case-by-case basis, imports of environmental technologies were freed from import customs duties. The import tax on cars equipped with a catalyser is lower too. An environmental charge (tax) is imposed on the sulphur content at the gate of the refinery and on all imported diesel fuel. There is also a small tax difference between leaded and unleaded petrol. The MIR strategy is focused on the promotion of primary measures and the introduction of cleaner technology, rather than on the introduction of expensive end-of-pipe methods in obsolete plants. The common environmental problems of some branches (e.g. furniture factories or detergent producers) were solved with MIR assistance, negotiating for example duty-free imports of cleaner technologies for the whole branch.

Several cleaner technology projects were drawn up, often with the help of foreign donors. Also NEAP lists a pool of projects to ease or prevent air pollution. However, there is little money to implement them.

6.3 Conclusions and recommendations

Despite the fact that emissions in Romania have decreased in recent years, air quality in the most polluted regions has not notably improved. Lower energy demand and a fall in overall production, together with the gradual introduction of abatement measures, were the main reasons for the decline in emissions. Romania's economy is based primarily on heavy industry. Obsolete technologies and equipment date back to the period before 1990. The

recovery and development of the industrial sector is also the basis for the country's further development. The need for sustainability is broadly recognized at the political level, and this favours the introduction of cleaner technologies and primary pollution prevention measures.

The Environmental Protection Strategy, the National Environmental Action Plan, the National Programme for the Adoption of the EU body of law and the Law on Environmental Protection include general provisions and directions for air management. In addition, two more specific sectoral approximation strategies, namely the Sectoral Approximation Strategy for Air and Climate Change (1999) and the Sectoral Approximation Strategy for Industrial Pollution Control (1999), have been prepared within the framework of inter-ministerial working groups, created by MWEP and assisted by a team of EU consultants supported by Denmark's Environmental Protection Agency. They have an excellent local knowledge as well as a thorough understanding of EU legislation and of the transposition procedure and provide sufficient guidance for the transposition of air-management-related EU legislation.

The Law on the Protection of Atmospheric Air, drawn up by the inter-ministerial working groups, was approved in December 2000. It is in compliance with EU legislation and covers all air management aspects. Draft fuel quality regulations have also been prepared by the MIR. However, most of the different regulations and standards required for the enforcement of the Law on the Protection of Atmospheric Air are still missing. The work of the two inter-ministerial working groups slowed down after the Danish Environmental Protection Agency's project was concluded. Delays in the preparation of further legal documents as well as in the reviewing of those prepared by other ministries are due to an insufficient number of air management experts at MWEP and ICIM. It should be pointed out that the transposition of air-management-related EU legislation (Figure 1.1) implies a large volume of specialized work by different experts. The timely adoption of the necessary legal documents, and a sufficient period of time for their entry into force, is important if the economy is to have clear conditions and sufficient time to adapt to them.

Recommendation 6.1:
The Government should ensure that sufficient staffing to deal with air management issues is secured within the Ministry of Waters and Environmental Protection (MWEP) and ICIM, and that the creation of an air protection unit in the MWEP is considered. (See also Recommendation 1.2)

Recommendation 6.2:
The Ministry of Waters and Environmental Protection should immediately draw up the necessary implementing regulations for the Urgent Ordinance on the Protection of Atmospheric Air (No. 243/2000), and submit them for adoption and step-by-step implementation in accordance with the Sectoral Approximation Strategies on Air and Climate Change and Industrial Pollution Control.

Ambient air quality monitoring is part of the national integrated monitoring system. At present two parallel air quality monitoring networks are in operation: the MWEP network coordinated by ICIM for emission standards and the MoH network coordinated by ISP(B) for air quality standards. Both networks are financed, organized and maintained separately, and share neither inter-laboratory comparisons nor a common QA/QC procedure. The annual national summaries are prepared separately too. None of the networks at present complies with EU requirements. There are no CO, benzene, PM10 or PM2.5 measurements available and O_3 measurements are inconsistent. Predominantly manual methods are used, the few available automatic analysers, mostly purchased with foreign grants, are not functional due to a lack of funds for their proper calibration, maintenance and operation. EU accession procedure also requires the harmonization of ambient air quality monitoring with the relevant EU directives. Continuous monitoring stations will have to be installed where upper assessment thresholds are exceeded, using automatic systems for measuring and reporting. The use of supplementary methods, e.g. manual methods with established compatibility evidence, dispersion modelling, emission inventories and indicative measurements such as passive diffusion samplers, could reduce the cost of monitoring.

Recommendation 6.3:
The Ministry of Waters and Environmental Protection and the Ministry of Health and the Family should jointly work at establishing a unified air quality monitoring network, providing comparable and complementary data, in compliance with EU requirements. Automatic continuous measuring devices should be combined with supplementary methods whenever possible. Sufficient financial resources for maintenance, service and continuous use should be secured before new devices are purchased. (See also Recommendations 1.4, 14.4)

Romania has a decentralized environmental protection management system where local EPIs play a key role in the enforcement of legislation. Communication between the national institutions (MWEP and ICIM) and the local EPIs seems to be efficient and well organized. Eight local EPIs are functioning as regional centres and their role is to facilitate the transfer of the necessary information and guidance from national to local levels. ICIM plays an important role in methodical guidance in air quality monitoring, emission inventory and dispersion modelling. However, at present it is not a State agency but an independent institution. It has no regular income from the State budget for either its regular monitoring services and methodological guidance of local EPIs, or the technical support provided to the MWEP. ICIM is also appointed to act as a reference laboratory for the environment in the future. ICIM (or the relevant part of it) should be appointed as the national environmental protection agency with an adequate and guaranteed budget, as recommended in Chapter 1, Recommendation 1.2.

The EU accession process, resulting in dynamic changes in legislation, implies additional implementation and enforcement tasks for all relevant institutions. A uniform emission inventory system, based on calculations, multiplying activity data and emission factors, is currently being introduced in all local EPIs . However, there are few emission measurement data available for the validation of the emission factors. Emission measurements are also essential for the enforcement of air protection legislation, in particular for assessing compliance with emission limits or compliance schedules. The latter are particularly important, as compliance schedules are a relatively efficient air quality management tool in Romania. Particulate matter, PM10 and PM2.5 in particular, should be thoroughly monitored as it is likely to increase as transport and road traffic are rapidly growing, in particular in urban areas. These compounds are known to have a severe impact on human health but were measured only during a few months in 1996. See Recommendation 14.4.

Recommendation 6.4:
The Ministry of Waters and Environmental Protection should ensure that the presently insufficient emission measurement capacities (both staff and equipment) in the local Environmental Protection Inspectorates as well as in industry are improved. The obligation on industry to monitor its own emissions should be more strictly enforced. The air monitoring stations of the national network should be better equipped in order to fulfil the monitoring plan and its targets. (See also Recommendation 1.6.)

Recommendation 6.5:
In the light of the increase in the car fleet and road transport over the past years and in anticipation of a further increase, the reduction of atmospheric emissions should be regarded as a high priority. Closer cooperation must be ensured between the Ministry of Waters and Environmental Protection and the environmental focal point of the Ministry of Public Works, Transport and Housing. In this respect, some of the measures to be envisaged and implemented are:

- *Improving and strengthening technical control of all road vehicles (including cars, trucks and buses);*
- *Improving the maintenance and quality of technical services for vehicles;*
- *Speeding up the drawing-up and implementation of a national programme relating to fuels.*

The contribution of the waste management sector to total emissions is unusually high (32% in 1997). The usual waste management method is to dump and then burn waste in the open air to reduce its volume. Besides CO emissions, highly toxic organic substances, such as polyaromatic hydrocarbons and dioxins, are thus directly emitted into the atmosphere. When close to human settlements, this might have a detrimental effect on human health.

Recommendation 6.6:
The Ministry of Waters and Environmental Protection should initiate the inclusion in the environmental legal framework of the prohibition of the open burning of waste at waste disposal sites, as well as the obligation to collect and treat (flare) or utilize the landfill gas generated in situ as a result of biological degradation of organic waste. (See also Recommendation 8.2.)

Chapter 7

WATER MANAGEMENT

7.1 Water resources

Quantity of water resources

Surface waters

The water resources in Romania are limited to some 1,700 m^3/year/inhabitant or 2,680 m^3/year/habitant if including the Danube's resources, a value relatively small when compared with other European countries (average 4,000 m^3/year/inhabitant). Romania has 4,864 watercourses with a total length of about 78,900 km. The characteristics of the main rivers are shown in Figure 7.1 and Table 7.1.

Ninety-eight per cent of Romania lies within the Danube river basin. One thousand and seventy-five kilometres of the Danube river flow over Romanian territory, of which 220 km form the border between Romania and Yugoslavia, 480 km between Romania and Bulgaria, 0.3 km between Romania and the Republic of Moldova, and 133.8 km between Romania and Ukraine. The river is regulated over most of its course.

Table 7.1: Characteristics of main rivers

	Length		Catchment area		Annual mean flow
	Total	in Romania	in Romania	as % of total catchment	
	km		*km^2*	*%*	*m^3/s*
Danube	2,857	1,075	237,104	29	5,700.00
Tisa	962	61	3,237	2	-
Somes	427	376	15,740	99	125.00
Tur	98	68	1,144	90	9.58
Crasna	180	134	1,931	61	5.53
Crisul Repede	1,212	171	14,860	54	24.90
Crisul Negru		164			29.40
Crisul Alb		234			23.70
Barcau		134			6.02
Ier		100			2.93
Mures	789	766	27,890	94	178.00
Bega	252	178	2,362	66	17.50
Timis	364	244	5,673	66	50.00
Caras	107	79	1,280	76	7.00
Siret	698	571	42,890	96	269.00
Prut	917	742	10,990	39	94.70

Source: Compania Nationala "Apele Romane".

Figure 7.1. Romania hydrographic network and hydrographic basin boundaries

The Danube Delta, where the River flows into the Black Sea, is an ecological system unique in Europe. Its ecological value is inestimable. It covers an area of about 550,000 ha of Romanian territory, with a hydrological network including main branches, secondary branches, channels and lakes with a wide variety of species of plants, fish, and birds, most of them migratory. Because of this biodiversity the whole zone has been declared a protected area and a World Natural Heritage Site (see Chapter 9).

Only 12% of the potential water resources of the territory could have been used for continuous water supply if the natural flow regime had not been modified. That is why over 1,300 reservoirs with a total capacity of 14 billion m^3 have been built for storing water and redistributing it when needed (400 have a capacity of over 1 million m^3 each). Most of them are multipurpose reservoirs for flood protection, drinking and industrial water supply, irrigation and hydropower production.

Table 7.2: Largest artificial reservoirs

Location	Reservoirs	Total volume *Millions of m^3*	Main users
DANUBE Basin			
Danube	Portile de Fier I	2,900	hydropower
Danube	Portile de Fier II	1,000	hydropower
PRUT River Basin			
Prut	Stanca-Costesti	1,400	complex users
SIRET River Basin			
Bistrita	Izvorul-Muntelui	1,230	complex users
ARGES River Basin			
Arges	Vidraru	473	complex users
OLT River Basin			
Olt	Venetia	375	hydropower
Lotru	Vidra	340	complex users
DANUBE Basin			
Mostistea	Iezer	280	complex users
SOMES River Basin			
Somesul Cald	Fantanele	250	hydropower
MURES River Basin			
Raul Mare	Gura Apelor	227	hydropower

Source: Compania Nationala "Apele Romane".

Table 7.3: Main natural lakes

Location	Lakes	Total volume *Millions of m^3*
DANUBE Basin		
Danube	Razelm (Razim)	909.00
Danube	Sinoe	210.65
Danube	Golovita	184.80
Danube	Oltina	59.90
Danube	Dunareni	51.90
Danube	Zmeica	45.60
Danube	Bugeac	41.09
Danube	Dranov	21.70
LITTORAL Basin		
-	Babadag	42.00
-	Periteasca	20.92

Source: Compania Nationala "Apele Romane".

There are also 2,000 km of canals and galleries for inter-basin water diversions and the reallocation of water resources according to the needs of agricultural irrigation in dry periods and other demands for water. However, more than 70% of the inland watercourses are in their natural state (i.e. unregulated).

Romania also has 194 natural lakes totalling an area of 132,730 ha and a water volume of 2,265 million m^3. A number of natural lakes are used for therapeutic purposes and have an international reputation, such as Techirgohiol and Amara.

Groundwaters

The National Institute of Meteorology and Hydrology has estimated the total exploitable sources of groundwaters to be 190.1 m^3/s. The most important groundwater resources can be found in the following basins: Danube 32.4%, Siret 10.8%, Arges 9.4%, Olt 7.2%, Ialomita 7%, Mures 6.4% and the littoral area 5.2%.

Quality of water resources

Surface waters

Rivers. Depending on their quality, watercourses are categorized as follows:

- *Category I* - includes waters that can become drinkable to supply the centres of population or animal breeding units, the food industry, salmonid farms and bathing resorts (pools).
- *Category II* - includes surface waters that can be used for industry, pisciculture (for fish that all not as sensitive to pollution as trout), and for urban and recreational use.
- *Category III* - includes waters for irrigating agricultural land, electric power production in hydroelectric power plants, industrial cooling installations, cleaning units and other purposes.
- *Category D* - includes degraded waters improper for the development of aquatic fauna.

About 40 physical, chemical, biological and microbiological parameters (such as oxygen content, biological oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), nutrients, organic pollutants, heavy metals) are used to categorize the waters. The limit values of the main pollutants depend on river categories (Table 7.4).

In 1999, the state of the rivers was as in Figure 7.2. Of the cadastered 78,900 km of rivers, 56,966 km are natural streams without any human influence and are classified first quality. The remaining 21,934 km, which are potentially affected by water users, are monitored. They are classified as follows:

- category I: 59% or 12,941 km
- category II: 26% or 5,703 km
- category III: 6% or 1,316 km
- category D (degraded): 9% or 1,974 km

Table 7.4: Quality standards for different river categories

River category	Pollution factor									
	BOD_5	COD	NO_3	NH_4	P t otal	Heavy metals				
						Pb, Cr	Cd	Cu	Fe	Zn
	mgO^2/dm^3		mg/dm^3							
I	5	10	10	1	0.10	0.05	0.00	0.05	0.30	0.03
II	7	20	30	3	0.10	0.05	0.00	0.05	1.00	0.03
III	12	30	-	10	0.10	0.05	0.00	0.05	1.00	0.03
D	>12	>30	>30	>10	>0.1	>0.05	>0.003	>0.05	>1	>0.03

Source: National standards STAS 4706 for surface waters, quality categories and conditions.

Note:

I - Very good/drinkable**; II -** Good**; III -** For industrial use**; D -** Degraded

The worst conditions, classified category "D", were encountered in the hydrographical basins of the Ialomita (37%), the Prut (about 20%) and the Vedea (12%). Nevertheless, overall surface water quality improved over the 1989-1999 period (Figure 7.3). This improvement is due mainly to the reduction in polluting activities, the enforcement of economic instruments (water use and water pollution charges) and also because measures have been taken to improve the treatment of waste water.

The Danube River carries a significant load of nitrates and phosphates from the countries upstream of Romania. The share of nutrient pollution from abroad (at Bazias) is 84.9% for nitrogen and 70% for phosphorous. Fifteen per cent of nitrogen and 30% of phosphorous pollution originate downstream from Bazias. In the country, nutrient pollution results from the discharge of waste water into the Danube's tributaries such as the Jiu, the Olt and the Argeş rivers, and the Ialomita, the Siret and the Prut rivers. There are also direct discharges of urban waste water from the towns on the Romanian bank of the Danube, such as Drobeta-Turnu Severin, Braila, and Tulcea, which do not have waste-water treatment plants. A number of industries (Romag Tr.Severin, Celrom Tr. Severin. Siderca Calaraşi, Comceh Calaraşi, Celohart Braila, Alum Tulcea, Comsuin Ulmeni) also discharge their insufficiently treated waste water directly into the Danube.

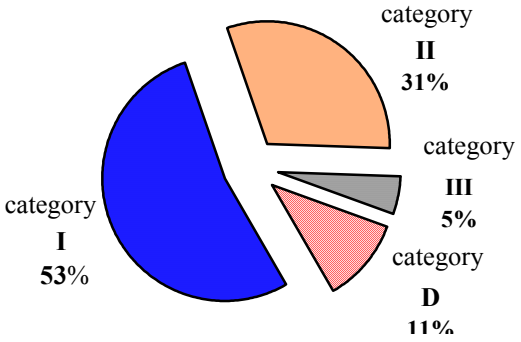
In 1999, breaches of category II limits (reaching category III) were recorded for some parameters in the following areas: Baziaş for P, N, Zn, Cr, Cd; Chiciu - Silistra for Zn and oil products; Giurgeni for P; Grindu - Reni for Fe and oil products; and Vilkov - Periprava for Fe and Zn. In 1999, because of the war in Yugoslavia, some parameters, in particular regarding heavy metals, exceeded the Romanian and international maximum allowable limits.

Lakes

Water quality in the lakes is generally adequate. In most cases, monitoring campaigns determined the trophic degree by following physical, chemical and biological indicators as well as the water temperature, its transparency, the oxygen regime, the nutrition regime, and the evolution of the bioceonoses.

Figure 7.2: Quality of river water, 1999

As % of total length of monitored rivers

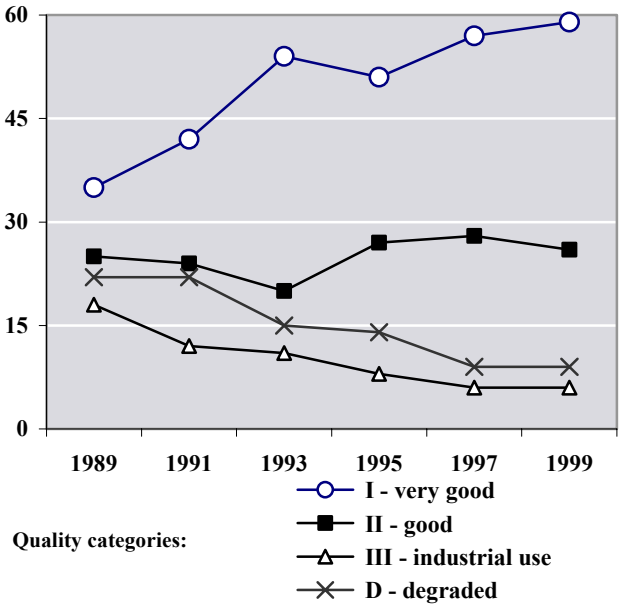


Source: Ministry of Waters, Forests and Environment Protection, Environmental State in Romania - Report for 1999, May 2000.

Note:
I - Very good/drinkable; **II** - Good; **III** - For industrial use; **D** - Degraded

Figure 7.3: Trends in river water quality, 1989-1999

As % of total length of monitored rivers



Source: Ministry of Waters, Forests and Environment Protection, Environmental State in Romania - Report for 1999, May 2000.

Table 7.5: Quality of water in main lakes and reservoirs, 1999

Hydrographical basin	Total number of monitored lakes and reservoirs	Category of water quality							
		I		II		III		Degraded	
		Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Total	**92**	**64**	**70**	**13**	**14**	**13**	**14**	**2**	**2**
Tisa	1	1	100	-	-	-	-	-	-
Someş	4	4	100	-	-	-	-	-	-
Mureş	6	6	100	-	-	-	-	-	-
Bega-Timiş	4	4	100	-	-	-	-	-	-
Nera-Cerna	3	3	100	-	-	-	-	-	-
Jiu	2	2	100	-	-	-	-	-	-
Olt	11	7	64	3	27	1	9	-	-
Agreş	12	10	83	2	17	-	-	-	-
Lalomita	6	3	60	2	40	-	-	-	-
Siret	18	13	72	3	17	-	-	2	11
Prut	9	2	22	2	22	5	56	-	-
Dunare	10	9	90	-	-	1	10	-	-
Litoral	6	-	-	-	-	6	100	-	-

Source: Ministry of Waters, Forests and Environment Protection, Environmental State in Romania - Report for 1999, May 2000.

Note:
I - Very good/drinkable**; II -** Good**; III -** For industrial use**; D -** Degraded

Figure 7.4 Pollution of groundwaters by nitrates

The state of the lakes and reservoirs was good in the hydrographical basins of the Tisa, Sorneş, Mureş, Bega-Timiş, Nera-Cerna and Jiu; it was inadequate in the basins of the Prut (category III: 56%) and in the littoral area (category D for some parameters and category III for others) and in Lake Amara (meso-eutrophic status). In the Siret hydrographical basin, the Jirlau and Amara lakes had high physico-chemical parameter values, which determined their inclusion in category D.

As regards the trophic degree of lakes and reservoirs, the following general aspects should be mentioned: 35 (38.1%) are oligotrophic; 6 (6.5%) are oligo-mesotrophic; 30 (32.6%) are mesotrophic; 1 (1.1%) are meso-eutrophic and 20 (21.7%) are eutrophic. In 1999, lakes Snagov and Caldaruşani (in the Ialomiţa hydrographic basin), Rogojeşti, Bucecea, Jirlau and Amara (in the Siret hydrographic basin), Negreni, Mileanca, Catamareşti, Dracşani, Halceni (in the Prut hydrographic basin), Razelm, Sinoe, Mariuţa, Fundulea, Gurbaneşti, Frasinet, Iezer, Mangalia and Corbul (Danube – littoral zone) were eutrophic, and required ecological rehabilitation to reduce their degree of eutrophication.

Groundwaters

Groundwater quality was characterized in 1999 taking into account the results of (1) general parameters referring mainly to natural phreatic water loading and (2) specific parameters set according to the nature of pollution sources existing in that area.

The following main pollution types were recorded according to the groundwater pollution factors and taking into consideration the data available for every hydrographical basin:

- pollution by oil products and phenol compounds of the phreatic water in Prahova Teleajen alluvial cone, over a surface of about 70 km^2 due to the Petrobrazi, Astra and Petrotel Ploieşti refineries;
- pollution by oil and petroleum products due to accidental or deliberate oil pipe breakages (for theft);
- pollution by various noxious compounds resulting from industrial activities (Victoria - Fagaraş, Codlea, Tohanu Vechi, Zarneşti, Bod, Işalniţa - Craiova, etc.);
- pollution by fertilizers and pesticides either during production (Azomureş, Archim Arad, Doljchim Craiova, Oltchim Rm. Valcea, Azochim Roznov, etc.) or in fields through inappropriate use;
- pollution due to unsuitable application of manure on the land;
- chemical and bacteriological pollution underneath big cities (Piteşti, Oradea, Bucureşti, Cluj, Suceava, etc.) and animal breeding complexes (Carei, Palota, Cefa, Halciu, Bontida, Baileşti, Beregsau);
- pollution generated by industrial and urban waste dumps because of a lack of environmental protection measures.

Consequently, a number of rural communities are not able to drink this water. Figure 7.5 presents the areas where groundwater was polluted by nitrates.

Black Sea

The Romanian seashore (247 km) is subject to some intense morphological changes and to pollution pressures. Pollution results from pollutants carried by the Danube, direct discharges of untreated or insufficiently treated waste water, and harbour activities. The major pollution sources are the Navodari Industrial Platform (fertilizer production), insufficiently treated industrial and household waste water from Constanta and Mangalia and maritime shipping.

The sediment quantity brought into the delta by the Danube flows has diminished by about 20% since reservoirs were built on the Danube and its tributaries. Consequently, the Black Sea ecosystems have undergone certain changes over the past two decades. The structure and the primary, secondary and tertiary biomass ratio have changed, the migration of certain prey fish from the Marmara Sea has diminished, while the populations of sturgeons and dolphins have declined. Due to the alluvium shortage the beaches are subject to steady erosion. Work to secure beach protection has to be permanent.

Romania's Black Sea coast is, however, a particularly attractive place. Together with the lakes in this area, including Lake Techirghiol, with a said healing potential, Romania's seaside can rival the most appreciated similar areas in Europe. However, significant levels of the main bacteriological strains (entero-bacteria such as total coliforms, faecal coliforms, faecal streptococcus that indicate household waste-water pollution) have been noticed in the southern Romanian littoral waters. In 1999, the highest number of total

coliforms was recorded in the Constanta North and Cap Midia monitoring stations. This was due to the conjunction of insufficiently treated industrial and household waste-water discharges (Constanta North, Constanta South, Mangalia) and the increased number of people during summer periods. The other monitoring stations showed values within Romanian standard limits (STAS 12585/87) for natural swimming areas.

According to the amended European Community Directive on Drinking Water (91/692/EEC) only faecal coliforms and faecal streptococcus were above the limit values. The total coliforms exceeded the limits during summer periods only. The presence of faecal coliforms and faecal streptococcus in bathing sea water represented a risk for human health.

The Black Sea Programme, which is currently implemented under the Black Sea Convention, aims at rehabilitating the marine ecosystem by combining all the efforts of the riparian countries.

7.2 Water use and water protection

Protection against floods

In general, the water regime of the rivers in Romania is high in spring with floods and low the rest of the year. Frequent and intense floods are one of the characteristic hydrological phenomena of Romania's rivers. During the past decade, floods were recorded every year causing human casualties and huge material damage, especially in the central, western and northern part of the country.

The worst damage recorded was from the 1970 floods, when the Olt, Crisuri, Mures, Somes, Siret, Prut and Dunare rivers flooded more than 1 million ha of lands, damaging 85,500 houses, 294 industrial facilities, 934 km of railways, 2,843 km of roads and 3,547 bridges and footbridges.

More recently, in spring 2000, heavy floods hit some 465 localities (7 fatalities; 9,502 houses damaged), flooding 88,000 ha of land, 575 bridges, and over 170 roads. The floods also washed away tons of tailing deposits from mines at Cristiotu de Sus (upper Crisul Negru river). In the mountains, stormy summer rainfalls may create heavy floods in specific catchments too. The plains in the south, however, are confronted with severe drought as was the case in summer 2000.

To diminish possible flood damage, large hydro-technical protection works were built: 1,848 embankments, with a total length of about 9,430 km; about 12,400 river banks and bank consolidation, with a total length of about 3,000 km; 4,000 km of regulated watercourses; 1,316 important reservoirs, with a total volume of 14 billion m^3 including buffer capacities of about 2.15 billion m^3. A major problem remains the risks that these hydro-technical works pose to communities and the social and economic infrastructure in the event of an accident.

Water supply

Table 7.6: Available and usable water resources

	Available resources	
	Total	for abstraction
	Billion m^3 / year	
Total	**216**	**26**
Inland surface waters	38	13
Danube	170-200	10
Groundwaters	8	3

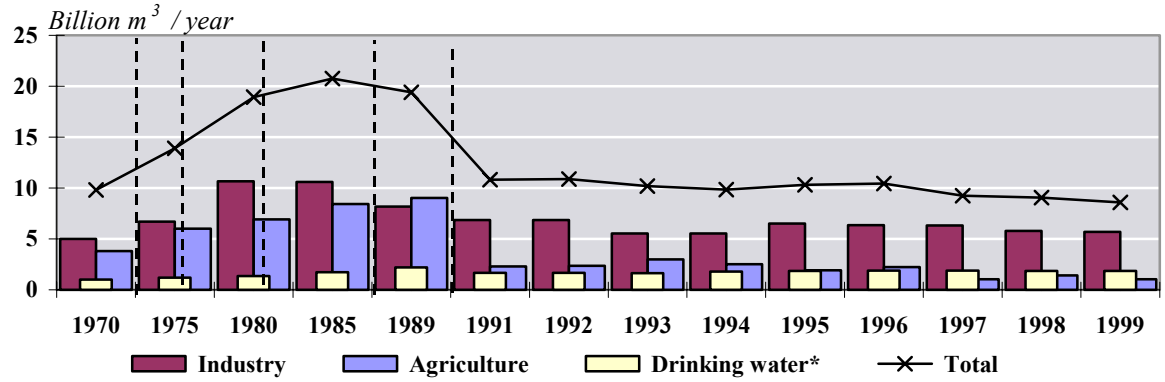
Sources: Ministry of Waters, Forests and Environment Protection; Environment Protection Strategy, Bucharest 1996; Compania Nationale "Apele Romane".

Surface water is the main source of water supply in Romania, see available water resources in Table 7.6. In 1999 water abstracted totalled 8.57 billion m^3: 7.44 billion m^3 was abstracted from surface water (5.0 billion m^3 from inland watercourses and 2.44 billion m^3 from the Danube), and 1.13 billion m^3 was abstracted from groundwater. The quantities of water used by the main consumers are presented in Figure 7.5.

In industry and agriculture water consumption grew steadily until 1989 (to respectively 8.17 and 9.03 billion m^3/year). After 1989, water consumption in these sectors drastically diminished (5.70 and 1.03 respectively in 1999) while household consumption remained rather stable (2.2 billion m^3 in 1989, 1.84 billion m^3 in 1999).

The drop in industrial water demand has been caused mainly by the economic recession and lack of markets for heavy industry products. The reduction in water consumption by agriculture has been brought about by the collapse of agricultural water-supply schemes. Land privatization led to the dismantling of water-supply schemes, an absence

Figure 7.5: Trends in water use, 1970-1999



Source: Compania Nationale "Apele Romane".
* Population and industry

Table 7.7: Public water supply, 1999

Hydrographical basin	Total water abstraction by municipal water supply systems		Supply of industry	Domestic water supply	Public consumption and losses of water (without wastage)
	Million m3 /year	*l/inhabitant/day*	*as % of total abstraction per inhabitant per day*		
Total	**1,840**	**492**	**14.9**	**49.2**	**36.0**
Bucharest	536.2	734	20.4	32.2	47.4
Arad	36.9	550	31.1	51.0	18.9
Bacau	39.3	511	8.6	53.8	37.6
Brasov	95.3	828	-	46.5	53.5
Cluj	90.4	742	-	49.0	51.0
Constanta	107.0	857	8.9	32.8	58.3
Craiova	48.7	420	22.7	55.5	24.6
Iasi	79.2	622	20.2	52.7	29.1
Tg. Mures	30.9	515	6.7	53.1	40.2
Ploiesti	82.2	895	12.3	51.3	36.4
Timisoara	70.0	592	18.3	66.0	15.7

Source: Romanian Water Association, National Report Regarding the Water Supply and Sewerage Systems in Romania, Bucharest, September 2000.

of maintenance of the irrigation infrastructures and a drastic decrease in the use of irrigation water as agriculture activities were handed back to a huge number of inexperienced private owners. The very high prices of energy for water distribution have also caused a dramatic shrinking in agricultural water demand. Because of the resulting shortages of water supply in the agricultural sector, crops now depend on weather conditions and have decreased substantially due to droughts.

The quantity of water abstracted for drinking water supply has remained unchanged, i.e. 500-800 litres per capita per day (Table 7.7). 11.3 million urban dwellers (91.8%) and 3.4 million of the rural population (33.5%) receive drinking water from public supply networks. All the 263 towns and municipalities have centralized water-supply systems as opposed to only 17% of the villages and rural settlements (2,648 out of 15,779); 71% of the population is supplied with drinking water originating from surface water and 29% from groundwater.

Excessive water demand created water shortages in a number of municipalities: in 1995, 36.3% of the

population experienced water supply cuts of under 8 hours a day, 7.5% of between 8 and 18 hours a day and 8.3% of more than 18 hours a day. Since then the problem has eased slightly; for example, due to a loan from the World Bank there is no longer any interruption of water supply in Bucharest. The huge numbers of breakdowns in water-supply networks, the lack of water metering, very low water tariffs, a discontinuous water supply, inadequate centralized hot-water-supply systems and inefficient use of water by consumers explain such excessive water demands, water losses and water wastage.

Water consumption in industry and agriculture is higher than in other countries due to obsolete technology and techniques, excessive water losses along the distribution networks and water wastage both in household and industrial installations. The specific consumption in certain industries such as the iron and steel industry, energy, chemicals and textiles also exceed consumption in the economically advanced countries by 1.5-2.0. Water used effectively in the irrigation systems represents only 40-50% of the total water pumped.

Waste water and other sources of pollution

Waste-water disposal and treatment

In 1999, a statistical analysis of the main waste-water sources indicated that:

- About 6,014 million m^3/year are discharged, of which about 3,033 million m^3, i.e. 50%, need to be treated;
- Of the 3,033 million m^3/year of waste water requiring treatment, about 18% is treated adequately. Of the remaining 82%, 32% is untreated and 50% is insufficiently treated;
- Municipalities discharge 71% of the waste water that needs to be treated, the chemical industry 9% and the metal-processing and machine-construction industry about 5%;
- The highest amount of untreated waste water is generated by the same entities: municipalities (urban waste water, 837 million m^3/year or about 85%), chemical industry (42 million m^3/year or about 4%), metal-processing and machine-construction industry (28 million m^3/year or about 3%);
- Over 69% of the insufficiently treated waste water is from municipalities, about 8% from the chemical industry and 6% from the extraction industry;
- Of the 1,326 waste-water treatment plants which were investigated in 1999, 45% were working properly, and the remaining 55% ineffectively;
- Average waste-water flows discharged an overall annual load of 21,200 tons of nitrogen, 5,900 tons of phosphorus, and 111,900 tons of BOD_5. In Romania there are no waste-water treatment plants with a tertiary purification step for nitrogen and phosphorus removal.
- As for urban waste-water disposal and treatment, 262 urban areas and 374 rural areas have sewerage. The data regarding waste water in 1998 indicated that:
  - 47 (17.9%) towns out of 263 have either no waste-water treatment plants or they are not operating; among them: Bucharest, Craiova, Galati, Braila, Drobeta-Turnu, Severin, Tulcea;
  - of the 15,779 rural settlements only 53 have waste-water treatment plants;
  - 77% of houses connected to a public water-supply system are also connected to an urban sewerage system.

Diffuse pollution

The decrease in diffuse pollution due to the use of fertilizers, pesticides and herbicides in agriculture is noticeable. Recent data showed that at the hydrographic basin level average concentrations of these substances which entered the watercourses were below the maximum permissible concentration. After 1989 the use of fertilizers in agriculture decreased by 50%, N and P fertilizer consumption having shrunk from 38 kg N/ha (the normal average) to 20 kg N/ha and from 18 kg P/ha to 10 kg P/ha.

Accidental pollution

60 cases of accidental pollution of surface water occurred in 1999 caused mainly by spills, leaks and road accidents. The number of spills has halved since 1995. Environmental pollution was caused by different hazardous substances:

- petrol in 40 accidents
- chemical products in 12
- slurry from metallurgical mining in 5
- others in 3.

Some of them had transboundary effects (e.g. Box 7.1).

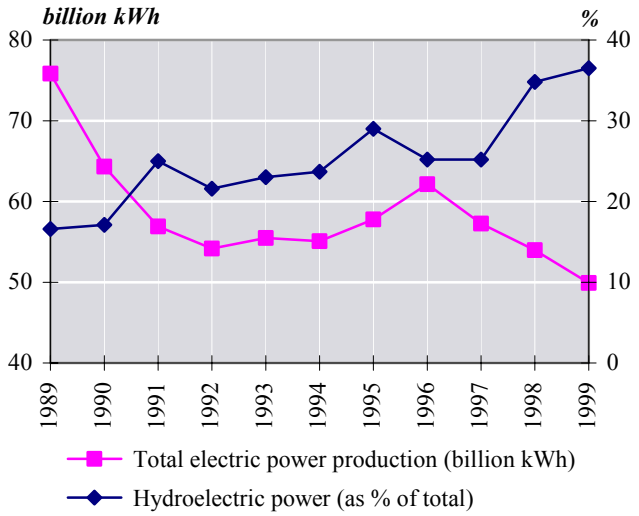
Box 7.1: The Baia Mare Accidental Spill

A serious accidental spill from a waste pool happened on 30 January 2000 near Baia Mare in the Maramures region in northern Romania. The Baia Mare Task Force (Box 5.1, Chapter 5) has identified the inappropriate design of the tailing pond, the acceptance of such a design by the permitting authorities and inadequate monitoring and dam construction, operation and maintenance as causes for the accident. These factors were triggered by severe weather conditions, which could and should have been foreseen. Some 100,000 m^3 of cyanide-contaminated water flowed into the Somes River and down to the Tisza River in Hungary and Yugoslavia and via the Danube to the Black Sea. A number of water intakes from the Tisza and Danube Rivers stopped their operation for a couple of days, among them the Tulcea (Danube Delta region) municipal water intake. There were no human casualties. But the accident has led to a modification of aquatic life (fauna and flora have reappeared but species are different from what they were).

The Aurul Company operates and maintains the mine-tailing pond. An environmental impact assessment was produced for this tailing ponds and its operation. It stated that there would be no danger of overflowing tailing pond in case of heavy rainfall. The company received 15 permits before obtaining an environmental agreement to operate the plant. Permits were provided by a range of national and local authorities. Both EIA and the licensing process took seven years. In early 2001, the plant had not yet been given official permission to resume operations, but the dam for the slurry pit has been repaired and it is foreseen that the production facility will restart soon.

Recent studies (1994-1999) of the Institute of Geography in Bucharest on mining activities and the quality of the environment in Maramura county and the inventory of the Environmental Protection Inspectorate in Baia Mare showed that 38 hot spots and 19 tailing ponds in this area need immediate and long-term rehabilitation. The same problem exists in other industrial areas: in the Ialomita River catchment, and around the Siret and Prut.

Figure 7.6: Electric power production, 1989-1999



Sources: Ministry of Waters, Forests and Environment Protection; Environment Protection Strategy, Bucharest 1996; Compania Nationale "Apele Romane".

Other water uses

Pig breeding

While large pig farms are facing economic difficulties due to market restructuring, the manure discharges from the huge existing pig-breeding facilities (up to 500,000 pigs for some of them before 1989) and other large animal farms (poultry, cattle) are point sources of severe pollution of surface waters (See more details in Chapter 11). In many cases, the river quality is retrograded to category "D" downstream from the breeding facilities.

Hydroelectric power

The country's hydroenergetic potential is 38 billion kWh/year, of which 26% from the Danube (See more details in Chapter 13). Figure 7.6 shows the share of hydraulic energy production over various years as against the total production. An increase in hydroelectric power production, which has been observed in the past few years, may cause shortages in the water supply

to municipalities, industry and agriculture in dry seasons.

Transport

The Danube represents the main means of transport among Europe's inland waterways. Two seas are connected through the main Danube and Rhine canals, i.e. the North Sea and the Black Sea, thus creating promising prospects for goods traffic from and to Romania.

7.3 Water policy objectives and management

Priorities for water policy

After a period during which privatization of water assets was pushed through, the new 2001 Government Programme puts special emphasis on the social aspects of water management such as water supply and flood protection, and on more ecological aspects such as water quality protection through approximation to the EU Directives on water quality.

The general objective of the 1995 Water Strategy, which is still valid today, is the rational use of water resources for the benefit of present and future generations. The priorities for water policy have been defined as follows:

- Reducing the water consumption growth rate in all branches of the economy;
- Ensuring the drinking water supply to the population and public sanitation;
- Rationally using and saving water within the different utilities, in order to reduce water demand;
- Protecting water resources and managing them in order to avoid shortage and pollution, having chiefly in view drinking water supply, food production and aquatic ecosystem conservation;
- Efficiently operating and using the existing facilities;
- Efficiently preventing any disasters such as floods and accidental pollution;
- Improving legislation and management;
- Involving the public in the management of water resources.

The policy has to be implemented taking into consideration a number of principles:

- The river basin is the natural physical entity for water management;
- Water quantity and quality management are closely related; therefore they must be tackled jointly by integrated and cost-effective/efficient solutions;
- Water management should be based on the principle of human common interest through close, all-level collaboration and cooperation of public administrations, water users, representatives of the local communities, in order to obtain maximum social benefit;
- The polluter pays principle should apply;
- Water is not an economic good like any other, but rather a precious heritage that must be defended, protected and treated as such.

The strategic objectives for a sustainable development of the water resources are also expressed in the updated NEAP. They include the following priorities:

(a) Ensure a drinking water supply to the population and public sanitation;
(b) Improve surface and groundwater quality;
(c) Restore the ecological state of rivers;
(d) Prevent and control floods, droughts and any other dangerous hydro-meteorological phenomena;
(e) Set up river basin committees.

Another major objective is improvement in the treatment of waste water. For instance, the priority defined in item (b) above is strictly linked to Romania's obligations under the Convention on Cooperation for the Protection and Sustainable Use of the Danube River. The Joint Action Environmental Programme for the Danube River Basin, January 2001-December 2005, has identified as key priorities for implementation 10 hot spots in municipal waste-water treatment (one of which is in Bucharest), 7 hot spots in industrial effluent control, 3 hot spots in agricultural pollution, and a number of hot spots related to pollution and potential accidental pollution caused by waste deposit sites and tailing ponds.

The 1994 Danube Strategic Action Plan under the Convention also contains provisions to protect the Black Sea and the Danube Delta against pollution by nutrient and hazardous substances, and is much concerned with transboundary issues. Under this Programme, a series of projects were proposed to GEF for financing. While in line with the projects contained in the NEAP, these projects focus more on nutrient pollution as it has a strong eutrophying effect on the Danube Delta and the Black Sea. The Bucharest waste-water treatment plant is the first

project that will be implemented under this Programme.

Legislation

The Water Law (Law No. 107 of 25 September 1996) is the fundamental legal act on water management in Romania. It covers all water bodies save mineral and geothermal waters. The Water Law states that the waters are an integral part of the public heritage. The protection, restoration and sustainable development of the water resources are actions in the public interest.

The Water Law established the ownership of water (art. 3), keeping the major water assets in the public domain. The Law has the following objectives (art. 2):

(a) the conservation, development and protection of water resources, as well as ensuring free water flow,
(b) protection against any form of pollution and modification of the characteristics of water resources, of their banks and beds or basins,
(c) the restoration of both surface and groundwater quality,
(d) the conservation and protection of aquatic ecosystems,
(e) ensuring a drinking water supply to the population and public sanitation,
(f) the complex valuation of waters as an economic resource and the rational and balanced distribution of this resource,
(g) the prevention and control of floods and of any other dangerous hydro-meteorological phenomena,
(h) ensuring the water requirements for agriculture, industry, power generation, transport, aquaculture, tourism, recreation and water sports as well as other human activities.

The 1996 Water Law also established the river basin concept for the management of water resources, both surface and groundwater. Any water use requires a licence or permit. A licence is needed also for discharging waste water and for draining water from mines and deposits into water bodies. The Law also states that the water supply for the population has priority over the use of water for other purposes. The Law provides for protected zones if needed.

The Water Law also laid down (art. 4) that the Ministry in charge of water management had to establish the water resource use regime and that the administration of public domain waters was the responsibility of "Apele Romane" (the Romanian Water Authority), which should set up (art. 84) a water fund. The details of "the water resource use regime", standards and norms figure in governmental or ministerial regulations (orders). However, a number of such regulations, which are still in force, were issued before 1996 under the former law. The most important of these secondary laws introduced before 1996 are:

- national standard STAS 1342 for drinking water quality, in line with WHO though not with EU standards;
- national standard STAS 1343 for standard water needs;
- national standard STAS 4706 for surface waters, quality categories and conditions, different from the new EU standards on surface waters;
- national standard STAS 9450 for irrigation water;
- norm NTPA-001 on the limit values of polluting substances discharged into receiving waters was approved by government decision; and norm NTPA-002 on the limit values of polluting substances discharged into sewerage systems by Ministerial Order No. 654/1997;
- waste-water discharges must be licensed and controlled by the competent national authorities also approved by government order;
- Government Regulation No. 981/98 on the status of Apele Romane (a joint-stock company) and on water and waste-water charges.

At present, Romania has to transpose EU legislation, including the Water Quality Directives. The Directives are at a different stage of transposition. In July 2000, about 35% of the water directives had been transposed (Chapter 1, Figure 1.1). The most advanced are the directives on dangerous substances 76/464/EEC (62%) and on drinking water measurement 80/778/EEC (55%) and the waste-water directive 91/271/EEC; the less advanced are the water framework directive (12%) and the fish directive. Only 4 of the 16 directives have an expected date of implementation. A key problem is to obtain grace periods for those directives that call for "heavy investments". Compliance costs related to the urban waste-water directive (representing over 90% of investment in

the whole water sector) were estimated at € 8-12 billion.

Institutional arrangements

Romania's water management system was established by the 1996 Water Law and the 1995 Law on Environmental Protection. Three main institutions compose this system:

- the Ministry of Water and Environmental Protection (MWEP),
- the National Water Authority "Apele Romane", which has river basin branches and provincial offices,
- the local Environmental Protection Inspectorates (EPIs).

Other ministries have also some responsibilities. For instance, the Ministry of Health and the Family monitors drinking water quality. The Ministry of Public Works, Transport and Housing regulates navigation and navigation-related activities.

MWEP draws up the national strategy and policies in water resources management and protection. The specific functions of the Ministry include:

- strategic planning, including the drawing up of national water management and development programmes,
- preparing legislation and policy,
- allocating and managing national budget resources for water management and infrastructure development,
- setting standards and controlling and monitoring compliance with them,
- preparing the administrative process for the regulated use of water resources through a licence and permit system,
- international cooperation and cooperation on transboundary water bodies.

Within MEWP, the State Water Inspectorate is responsible for the inspection and control of implementation of the legal provisions. The local Environmental Protection Inspectorates are responsible for issuing licences and permits as well as for inspection and control of water quality and emissions into water bodies.

Apele Romane is in charge of the implementation of the national water management strategy. Apele Romane is a joint-stock company that is 100% owned by the State through the Ministry of Waters and Environmental Protection. The company undertakes management tasks with its 11 river basin branches (Figure 7.1) and local offices. Apele Romane is self-sufficient. The costs of its operation are covered by the water charges paid by water users. The company:

- administers and maintains the surface watercourses, lakes and inland sea and groundwater bodies,
- promotes the optimum allocation of the water resources to the water users, their rational use and protection against their the overuse and depletion,
- protects water quality against deterioration and pollution and prevents and controls accidental pollution,
- protects against floods and droughts, coordinates reservoir operations and development of the water system,
- monitors the quantity and quality of the aquatic environment and of the water used,
- distributes the budget funds to basins and redistributes income from water and waste-water charges.

The branches of Apele Romane acting within the river basins (Figure 7.1) and their provincial offices have special responsibilities for:

- the preparation of plans for river basin management, flood and drought control;
- agreements on water abstraction and use with water users and with waste-water dischargers which are based on the licences and permits issued by the local Environmental Protection Inspectorates;
- monitoring such agreements and respect for the provisions of the licences and permits, as well as collecting water and waste-water charges;
- the operation of monitoring networks for hydrological information and water quality;
- the maintenance of water management works and operation of hydraulic structures, reservoirs, channels and other diversions, which are entrusted to Apele Romane, among them 260 reservoirs of the 400 with over 1 million m^3 of capacity (the other 140 are under the Ministry of Industry and Mineral Resources);
- the preparation of technical reports to EPIs in view of the delivery of licences and permits.

Responsibility for drinking water supply, waste-water disposal and treatment lies with the local authorities. The water users (municipalities and industries) are obliged to prepare, and apply if necessary, their own plans for the prevention and

control of accidental pollution that might occur as a result of their activity.

7.4 Instruments for implementation and enforcement

Monitoring

Apele Romane monitors the *quality of rivers* in 22,000 km out of 78,900 km, using 318 gauging stations. When flows are high, water quality data are transmitted daily from 65 control stations. When flows are low, surface waters are monitored (immission monitoring) in the 318 stations once a month. About 40 physical, biological and microbiological parameters are measured.

There are water quality standards, necessary for the interpretation of the analysis results and the assessment of water quality. The assessments are carried out according to standard STAS 4706/1988 on the classification of surface water. There are also standards for the analytical methods used for determining each kind of parameter. The spatial density of the monitoring network for surface waters is one control section every 745 km^2, and is in compliance with the EUROWATERNET European Network.

Apele Romane monitors *water quantity* in 1,016 hydrometric stations by measuring the flows. About 40% of the water quality monitoring stations also monitor quantity. For the other stations discharge information is transmitted from the nearest hydrometric station.

The water quality of the Danube River is monitored by Apele Romane in cooperation with ICIM. The location of measuring points, the monitored pollutants, and all information on sampling are correlated all along the River and among the different riparian countries. In each country there is a centre for early warning of accidental pollution, connected by satellite. In Romania, the centre is located in the MWEP and is technically supported by ICIM.

Groundwater is monitored by Apele Romane in 3,695 hydrological stations, of which 1,434 take qualitative measurements. In addition there are some 12,000 survey points situated in the vicinity of pollution sources, drillings and water wells for water supply, mainly in rural areas. Eighteen general physico-chemical parameters (temperature, pH, conductivity, total dissolved solids, oxygen regime, nutrients, etc.) are measured in groundwater. For the drinking water supply, bacteriological parameters are measured too. For the boreholes that might cause pollution (oil exploration), specific parameters are measured depending on the potential pollutants. Sampling frequency is between 2 and 4 times a year. There are standards for the analytical methods for each type of parameter analysed. The analysis results are validated by comparison with the water quality requirements of STAS 1342/1991 – drinking water.

Black Sea water quality is monitored by Apele Romane and the Marine Research Institute every year at 13 sampling stations. Between Navodari and Vama Veche the sampling from March to October is monthly and between Sulina and Midia seasonal. Twenty-eight physico-chemical parameters are monitored (oxygen regime, TDS, nutrients, organic pollutants, heavy metals, etc.), three biological parameters (phytoplankton, zooplankton, zoobenthos) and four microbiological parameters (mesophil bacteria, total coliforms, faecal coliforms, faecal streptococci). For their interpretation, the results are compared to standard 4706/88 values for Black Sea surface water.

The monitoring of waste-water discharges (emission monitoring) of about 2,100 point pollution sources is performed by Apele Romane. EPI laboratories can perform environmental audits or inspections. EPI laboratories can also perform water analyses on a commercial basis.

The accreditation process, according to international standards (ISO 9000), has just started in Romania. At present the quality assurance system consists mainly of parallel sampling and analysing (inter-calibration) between the laboratories of Apele Romane and foreign laboratories, followed by a spatial analysis of the results. Ten of the forty-one "Apele Romane" provincial laboratories are very close to accreditation at national level, by RINAR, the national accreditation body.

Licences and permits

According to the Water Law, the rights to use surface and groundwaters are established through water management licences. Such rights also include waste-water discharges to surface waters, drainage, mining and other discharges (art. 9). The Water Law also seeks to ensure that discharges to waters meet the pollutant limits and loads defined in the licences and permits based on norms NTPA-001 and NTPA-002. According to the Law on Environmental Protection and the Water Law,

the licences and permits are issued by the local EPIs in close collaboration with the river basin and provincial offices of Apele Romane. There is a close relationship and collaboration between EPIs and Apele Romane.

Licences and permits are issued for no more than 5 years. Pollution limits are set in the licences and permits. These limits are water quality standards and not emission limits: they are defined for each pollutant, fixing a maximum concentration in the receiving water body according to its quality class. Compliance with the permit is verified by EPIs from 1 to 24 times a year, depending on the importance of the discharge. Self-monitoring, which is unevenly carried out by the polluters or subcontracted to local EPIs or Apele Romane laboratories, is not used to assess compliance with permit conditions.

Economic mechanisms

In Romania, economic instruments for water management and protection include *service charges (drinking water treatment and distribution, and sewage network and waste-water treatment), various water charges, taxes, penalties* and *allowances* (bonus) (more in Chapter 3). They aim at a rational and economical management of waters to ensure that users respect the quality limits for water discharges, to prevent the depletion of the water resources and to avoid quality damage. *Water extraction charges* are the same all over Romania, but differ according to the source of water (inland rivers, Danube, groundwater) and the category of user (industry, household, power plant, agriculture, fisheries). In August 2000, the prices of raw water (water charges) were approved by the Office of Competition at a level of 0.09 lei/m^3 for electricity production and 71.2 lei/m^3 for municipal water supply up to 153.6 lei/m^3 for industrial water abstracted from groundwaters. The pollution charges are levied on a set of pollutants and aimed at reducing their content in the rivers to within the limits set by the law. If the limits are exceeded, fines or penalties are levied. Penalties are levied for non-compliance with the permits or contracts, for both water intakes and discharges of waste water. The purpose is to reduce the environmentally harmful impact of certain activities and oblige users to respect the permits. The penalties are used as income for the Water Fund.

The income from all water charges is used to cover Apele Romane's operating costs. It does not include any financial resources for the development of water infrastructures. To improve the economic mechanisms for water resources, the level of service prices and water charges has been updated recently in line with the inflation rate; the fines for violations have also been updated.

Drinking water that is supplied to the population by municipal water supply systems is paid for by its consumers, but the price charged is well below the real cost of water. The tariffs for water supply and sewerage services differ according to the municipality, depending on the type of infrastructures used. In July 2000, the tariff fluctuated from 3,780 lei/m^3 (or US$ 0.18/m^3 in Ploiesti) and 4,670 lei/m^3 (or US$ 0.23/m^3 in Bucharest) to 9,904 lei/m^3 (or US$ 0.48/m^3 in Petrosani).

Expenditure

Expenditure on investments in water management in the different branches of the economy in 1997-2000 is presented in Table 7.8. In 2000, this expenditure is expected to reach 0.61% of GNP. Because of the very low GNP, the amount of financial resources for water management investments is very low. Due to this shortage, many very important investments in diversion channels, flood-control reservoirs and waste-water treatment plants have been stopped. For example, 31 waste-water treatment plants just under construction cannot be completed for lack of finance; only one of them in Constanta receives financial support from PHARE.

The need for new investments in the water sector is very high. For example, work on hot spots identified under the Joint Action Programme for the Danube River Basin is prioritized for implementation, and has been retained for financing under ISPA. The financial resources needed to control the 10 municipal discharge "hot spots" have been estimated at € 393 million, while the State budget for 2000 on investments in water management stands at € 25 million. Another € 30 million is needed to solve the problems of industrial and agricultural "hot spots".

Most of the 286 projects retained in the 1999 NEAP concern water facilities. ISPA is recognized as the key funding source for those projects. In the short term, ISPA will spend € 1,053 million on waste-water treatment and water management over a period of 7 years. Water and waste-water priority projects proposed for financing by ISPA are listed in Table 7.9. The minimum domestic contribution

Table 7.8: Financial resources allocated to investment in water management, 1997-2000

Activity	Financial sources	1997		1998		1999		2000	
		billion lei	*as % of GNP*	*billion lei*	*as % of GNP*	*billion lei*	*as % of GNP*	*billion lei*	*as % of GNP*
Total general		**114.4**	**0.045**	**194.2**	**0.052**	**425.8**	**0.081**	**797.1**	**0.102**
of which:	State budget	114.4	0.045	194.2	0.052	318.7	0.061	482.3	0.062
	External credits	-	-	-	-	107.1	0.020	314.8	0.040
Sources for water supply (reservoirs)	State budget	54.8	0.022	100.5	0.027	115.6	0.022	138.2	0.018
Flood control works	State budget	59.6	0.023	93.7	0.025	203.1	0.039	344.1	0.044
	External credits	-	-	-	-	107.1	0.020	314.8	0.040

Source: Ministry of Waters and Environment Protection.

to any project co-financed by ISPA is 25%, an amount that Romania will find difficult to afford in the present circumstances.

7.5 Conclusions and recommendations

Romania's water system is broadly developed. Quantitatively, its water resources are sufficient to cover its water demand. In particular, hydrostructures have spare capacity and are generally sufficient to manage floods and droughts. a period of 7 years. Water and waste-water priority

In some places, however, water resources are badly affected by pollution. About 9% of the river stretches that are monitored are excessively polluted. The degradation of river water quality has been caused mainly by untreated waste-water discharges from municipalities: only 18% of municipal waste water is treated properly. The capital city, Bucharest, still has no waste-water treatment plant. The degradation of groundwater is caused by heavy farming practices, in particular incorrect manure spreading and overfertilizing of the fields (pollution by nitrates). Accidental pollution from industrial tailing ponds is also a serious problem.

Excessive per capita water consumption is a big problem in Romania. Because of the recession and the collapse of irrigation systems, water consumption by industry and agriculture has fallen considerably over the past ten years. Nevertheless, industry (including energy production) is still responsible for 60% of water demand. An effort should be made to reduce this consumption firstly by closing cooling loop systems.

Even worse is the demand for drinking water for household purposes. It has stabilized at a very high level with an average consumption of 500 litres/inhabitant/day. This is, in fact, due to water losses in the obsolete distribution networks, and very largely to water wastage by the consumers. The lack of individual water meters, the very bad state of household plumbing, the cuts in water supply and the irrational consumption by the people themselves are all causes of this over-consumption. The consequence is a correspondingly excessive volume of waste water generated by the users, leading to a need for a correspondingly oversized sewage network and waste-water treatment facilities, and unnecessary investment.

Recommendation 7.1:
The reduction of excessive drinking-water use caused by water wastage and losses should be a priority in the rationalization of water use in Romania. To solve this problem, it is necessary to:

- *rehabilitate the water supply system and ensure continuous supply of drinking water and hot water where centralized hot water supply systems exist. This implies the rehabilitation, upgrading and automation of hot water supply systems and household installations;*
- *install individual cold and hot water metering;*
- *increase drinking-water and waste-water tariffs so as to cover the full cost of water supply and waste-water disposal and treatment, incorporating the cost of renovation investments;*

Table 7.9: Proposed priority investment projects in the water sector for ISPA financing

Million Euro

Approved projects		Estimated project value	ISPA commitment
Total		**308.8**	**134.0**
ISPA 2000			
Constanta	Waste water	98.0	44.3
Iasi	Waste water	51.7	23.8
Craiova	Waste water	70.6	38.3
Jiu Valley	Waste water	9.7	5.8
ISPA 2001			
Arad	Waste water	18.0	8.1
Braila	Waste water	60.8	13.7
Stand by projects		**Estimated project value**	**Requested to ISPA**
Total		**258.4**	**193.7**
Brasov	Waste water	67.1	50.3
Timisoara	Waste water	62.0	46.5
Cluj-Napoca	Waste water	64.5	48.4
Pascani	Waste water	27.2	20.4
Oradea	Waste water	23.9	17.9
Focsani	Waste water	13.7	10.2
Technical assistance projects			**TA requested to ISPA**
Total			**4.929**
Bucharest	Waste water		1.350
Dobreta Turnu Severin	Water management		0.750
Botosani	Water management		0.525
Galati	Waste water		0.675
Baia Mare	Water management		0.570
Buzau	Waste water		0.225
Mures Valley (Hunedoara County)	Waste water		0.590
Focsani	Waste water/ tender documentation		0.244

Source: Ministry of Waters and Environmental Protection, ISPA Implementation Unit, 2001.

- *develop economic incentives to encourage owners of buildings and flats to repair their water infrastructures. See also Recommendation 14.1*

An adequate framework legislation for water management is provided in the 1995 Law on Environmental Protection and the 1996 Water Law. While the Water Law now needs some adjustments and amendments, the ongoing transposition of European Union water quality legislation will solve this task. However, the implementing legislation is obsolete, dating mostly from before 1996, i.e. not adjusted to the new laws. Laws now chiefly need to be effectively implemented.

Recommendation 7.2:
The Ministry of Waters and Environmental Protection should urgently update the implementing regulations for water legislation, and implement them effectively. Implementation should be accompanied by an action programme for hot spots, in particular industrial sites discharging hazardous substances directly into waters further used for drinking-water supply.

Romania's water management institutions have been shaped and developed with a view to achieving and implementing the river basin management concept. Today Apele Romane has 11 offices at river basin level, which almost fulfil the role of river basin authorities (or agencies).

However, their management system is too centralized: many decisions are made at the top by Apele Romane at headquarters or by MWEP. In a river basin management concept, as developed in the EU, the river basin authorities are self-sufficient and self-managed institutions with responsibility for water management in specific basin areas. They should be assisted by river basin management committees, in which the major stakeholders (individual users, municipalities, industry, agriculture, etc.) are represented and can voice their concerns and interests. The financial resources to cover the costs of the operation, management and development of river basins, and help finance the related investments, should come from water and waste-water charges.

Although already geographically delineated, Romania's river basins do not function according to this scheme. The existing 11 river branch offices of Apele Romane should become self-sufficient and self-managed river basin authorities. The financial resources, which will cover the costs of operating, managing and developing river basins, have to come from water and waste-water charges. Compared to the situation today (see above the section on institutional arrangements), the river basin authorities' tasks will generally be similar to the current tasks of the branches of Apele Romane, except that the river basin authorities will also collect and redistribute the financial resources within their jurisdiction. In this context, the Apele Romane Headquarters would have only administrative power on behalf of MWEP to supervise the functioning of water management systems and the river basin authorities. Apele Romane's cost of operation would be covered by the State budget.

Recommendation 7.3:
River basin authorities should be brought into line with the EU concept as self-sufficient and self-managed institutions entrusted with managing the water and protecting the surface and groundwater in their respective basin areas. Apele Romane Headquarters should be seen as a water agency entrusted with administrative power by the MWEP to supervise the functioning of water management systems and the river basin authorities.

A number of enforcement instruments – water licensing, water charges and water monitoring – are in place but implemented loosely. Water and waste-water charges paid by water users to Apele Romane basin management offices are used to cover the cost of operating and maintaining the water system and the functioning of Apele Romane itself. But these charges are too low to provide for any new investment or the complete overhaul of obsolete networks. The tight State and local-authority budgets make it impossible to implement the construction programme for new water management facilities and waste-water treatment plants. Available foreign aid is not even sufficient to solve the problems of identified hot spots, and demand an additional domestic contribution that Romania is unable to afford. In such a situation, it is necessary to reconsider the nature of the economic instruments (see Chapter 3) and the level of the water and waste-water charges.

Development of the national and local water systems can be financed only through an increase in water charges to promote new investments in public water supply and waste-water treatment. The existing water and waste-water charges hardly cover the cost of operating and maintaining surface and groundwater bodies and are not adjusted to the inflation rate. The river basin committees and councils and the river basin authorities with the agreement of the MWEP and the Ministry of Finance should set new charges adapted to the needs of managed river basins and the capacity to pay of the water users, i.e. households, industry and agriculture.

Recommendation 7.4:
On the initiative of the Ministry of Waters and Environmental Protection, Apele Romane and municipalities should reconsider drinking-water and waste-water charges and pricing, increasing them and differentiating them according to the type of use and taking social aspects into account. This income should be used together with other sources of funds for financing the development of national and local water systems and new investments in water infrastructures. New investments, especially in municipal water supply and waste-water treatment plants, should take into account the likely drop in water consumption which should be brought about by an improvement of the water supply network, water metering and pricing system.

While indicated in the permit, self-monitoring to measure whether the discharges meet licence and permit requirements is very unevenly carried out by the polluters. When it is, the adequacy of the methodology and analytical procedures and the reliability of the results are questionable. Often, measuring is subcontracted to Apele Romane or to a local EPI laboratory, possibly leading either to a duplication of information or no information. This way of acting is due to a lack of clarity as to the

way pollution monitoring should be carried out and who is responsible for it.

Recommendation 7.5:
The self-monitoring of waste-water discharges and pollution loads should be regulated by law and carried out by accredited laboratories. The monitoring of emissions and immissions performed by the local Environmental Protection Inspectorates (EPIs) and Apele Romane should be harmonized. The quality of measurements by Apele Romane and EPIs should be improved by strengthening the laboratory accreditation process.

For transboundary water problems, see Chapter 5 and Recommendations 5.3 and 5.4.

Chapter 8

WASTE MANAGEMENT

8.1 Waste generation

Overall waste generation

Mines, industry and municipalities are the main generators of waste (Table 8.1). From 1995 to 1999, mining waste was reduced tenfold (from 301 to 35 million tons), while industrial waste shrunk from 51 to 34 million tons. The reductions are fully linked to the economic decline and to the reduction in production. Municipal waste has remained fairly stable at around 6-7 million tons per year. The composition of waste varies according to the region and the time of year. The generation of municipal and industrial waste by county in 1999 is given in Table 8.2.

Industrial waste

Main industrial activities

Romania is relatively rich in industrially important natural resources: lignite, bituminous and brown coal; oil and natural gas; polymetallic ores containing gold, silver, magnesium, copper; ferrous and polymetallic ferrous ores; bauxites; uranium ores; deposits of salt; sulphur; limestone; dolomite; and kaolinitic rocks. The mining and processing of all of them generate waste (mine tailings, see Chapter 10). The main industrial sectors are based on the reprocessing of domestic raw materials. Industrial facilities cover the iron and steel industry; the chemical and petrochemical industry; energy production, mining; building and construction materials; machinery and equipment; textiles and footwear.

In 1989 industry contributed more than 50% to GDP, a share that has fallen 10% in the past ten years. In 1999, it was 40%. The volume of the main industrial products decreased 30 to 50% in 1999 as compared to 1989. The reasons are the lack of market possibilities, the country's lack of knowledge and expertise in developing a market economy and in implementing sustainable development principles as well as a lack of national financial resources.

Table 8.1: Generation and management of waste, 1995-1999

	Generated				Recycled/Used		Incinerated		Disposed and stored	
	Total waste	Mining waste*	Industrial waste	Municipal waste						
	million tons				*million tons*	*as % of total*	*million tons*	*as % of total*	*million tons*	*as % of total*
1995	**360.0**	301.7	51.4	6.9	19.7	*5.5*	0.4	*0.1*	339.9	*94.4*
1996	**114.0**	59.0	48.1	6.9	21.2	*18.6*	0.3	*0.3*	92.5	*81.1*
1997	**217.5**	169.8	41.7	6.0	12.0	*5.5*	0.3	*0.1*	205.2	*94.3*
1998	**83.1**	41.8	35.5	5.8	9.3	*11.1*	0.4	*0.5*	73.8	*88.8*
1999	**76.5**	36.7	33.6	6.2	11.0	*14.4*	0.2	*0.3*	65.3	*85.4*

Source: Ministry of Waters and Environmental Protection, 2001.

* Excludes industrial waste

Table 8.2: Waste generated and managed by county, 1999

Thousand tons

	Generated	Recycled	Disposed	Incinerated	Stored
Total	**76 481.2**	**10 972.4**	**62 738.6**	**213.8**	**2 556.5**
Alba	3 127.1	111.9	3 014.4	0.0	0.1
Arad	661.2	31.1	598.1	28.1	3.9
Arges	659.7	313.0	275.7	1.9	69.1
Bacau	2 815.3	2 044.4	737.7	20.5	12.8
Bihor	1 179.4	54.4	1 010.6	13.7	100.7
Bistrita Nasaud	398.1	34.2	353.2	6.2	4.5
Botosani	120.9	24.5	95.5	0.1	0.9
Brasov	1 069.2	202.1	798.8	20.8	47.5
Braila	225.7	31.2	147.8	17.6	29.2
Buzau	259.0	62.1	191.6	0.2	5.2
Caras Severin	1 062.0	358.5	682.7	4.1	16.7
Calarasi	197.3	26.0	88.7	0.0	82.6
Cluj	1 399.5	361.6	811.9	4.2	221.9
Constanta	1 925.0	216.2	1 595.5	0.7	112.6
Covasna	2 398.4	18.0	2 303.6	0.0	76.8
Dimbovita	1 413.6	156.2	1 231.4	0.2	25.7
Dolj	1 989.6	287.5	1 692.3	4.1	5.7
Galati	2 369.8	1 041.7	1 314.9	5.1	8.2
Giurgiu	63.1	8.3	41.6	0.1	13.2
Gorj	1 867.7	33.0	1 829.8	0.0	4.9
Harghita	715.9	102.3	612.6	0.2	0.9
Hunedoara	5 111.7	544.1	4 560.4	0.2	7.1
Ialomita	445.7	70.5	354.9	12.8	7.5
Iasi	776.0	227.7	541.4	0.1	6.8
Maramures	3 554.6	91.0	3 408.8	0.1	54.8
Mehedinti	8 366.1	46.7	8 318.5	0.1	0.9
Mures	1 626.6	301.5	510.5	0.2	814.4
Neamt	800.3	268.6	515.7	0.4	15.5
Olt	439.0	310.7	108.4	0.0	19.9
Prahova	3 324.8	2 163.8	1 103.5	14.1	43.4
Satu Mare	429.5	170.3	234.9	0.0	24.2
Salaj	2 650.6	62.5	2 584.3	0.0	3.7
Sibiu	439.4	155.3	281.6	0.1	2.5
Suceava	1 028.7	241.6	740.1	30.8	16.1
Teleorman	295.0	46.5	124.7	10.4	110.3
Timis	1 129.4	234.2	805.3	0.1	89.7
Tulcea	1 356.4	96.9	1 251.3	7.4	0.9
Vaslui	181.4	35.8	127.0	0.3	18.3
Vilcea	17 827.2	97.2	17 330.4	0.5	399.2
Vrancea	197.0	47.1	124.0	0.1	25.9
Bucuresti	581.8	239.0	283.1	7.9	51.8
Rez. Delta Dunarii	2.1	0.1	1.9	0.0	0.1

Source: National Research and Development Institute.

The following are among the most polluting industrial facilities: the non-ferrous metallurgical plants in Copsa Mica, Slatina, and Baia Mare; the chemical and petrochemical plants in Fagaras, Borzesti, Savinesti, Dej, Ploiesti, Teleajen, Potesti; the pulp and paper and fibres plants in Dej, Brila, Lupeni; mineral fertilizer plants in Arad, Isalnita, Tg. Mures; and the iron and steel facilities in Hunedoara, Calan, Resita, Galati, Calarasi. Other facilities are soil contaminators: Videle Schela Petroliera; Poeni Schela Petrol; Holboca Centrala Electrica de Termoficare; Slatina SC Alro Slatina SA; Calimani Exploatarea Miniera Herja; Baia Mare Exploatarea Miniera Herja; Doicesti Filiala Electrocentrale; Rovinari Filiala Electrocentrale; Turceni Filiala Electrocentrale.

Under the current privatization process, the new owners are responsible for solving the environmental problems they create and, as a result, waste management has improved in a few enterprises. However, there are some facilities, equipment and chemical storages for which the State took responsibility for past pollution. Privatization and industrial modernization should be carried out in parallel with the introduction of the best available technologies and practices that are already applied in EU countries.

Industrial waste generation

Industrial production determines the quantity and composition of the industrial waste. The main categories of industrial waste (Table 8.3) are mining waste from coal and the metallurgical industries, slag and ash from thermal power plants; waste-water treatment sludge; chemical waste; and metal-containing waste (ferrous and non-ferrous) from metallurgical processes. The quantity of industrial waste generated decreased considerably between 1995 and 1999 following the decrease in industrial activities (Table 8.1). End-of-pipe treatment is rare, though a positive example is the installation of purifying filters at "Romplumb" in Baia Mare, which recover about 2.5 tons of lead per day.

About 2.3 million tons of hazardous waste are generated each year, which represents about 3% of all industrial waste generated. The European Waste Catalogue is used to identify hazardous waste. For Romania, 142 out of 237 such categories of waste were identified from the Catalogue. The main categories of hazardous waste are caustic lyes, phosphogypsum, oil-containing waste, slag from non-ferrous metallurgical processes, metal treatment waste, sodium hydroxide waste, tar and distillation residue, and industrial sludge containing heavy metals and cyanides.

Table 8.3: Waste generation by type, 1999

Thousand tons

Type of wastes	Quantity
Total	**76,500.0**
Mining from coal industry	35,666.0
Municipal	6,200.0
of which: households	5,235.0
Ash	6,443.0
Sludge from waste-water treatment	2,529.0
Ferrous	1,984.0
Non-ferrous (metallurgical)	2,603.0
Construction waste	1,277.0
Chemical waste	2,254.0
Wood waste	768.0
Agricultural waste	931.6
Medical waste	7.2
Others (including other mining waste)	15,837.2

Source: National Research and Development Institute.

Introduction of cleaner production

So far, practices and economic incentives for using cleaner production processes have not been developed in Romania due to the economic crisis and the lack of investment, including foreign investment. No action has been taken at government level to promote more environmentally friendly technologies. No cooperation has been developed with international organizations, such as UNIDO or UNEP, that carry out activities to set up cleaner production centres in countries in transition. It is foreseen that EU Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC) will be introduced in Romania by 2003. All specific requirements for the establishment of integrated licensing in compliance with the IPPC Directive will be transposed in a new government decision on IPPC by 1 November 2003. Ministerial Order No. 756/1997 for approving the assessment of environmental pollution will also be amended. These documents, together with provisions on the introduction of cleaner production, should ensure that all methods for reducing waste generation at source are applied.

There are many proposals to improve existing but underdeveloped waste recovery processes (see below) or to introduce new methods for raw materials reprocessing, but the dire economic situation means that they cannot be implemented. This is the case in the Letea Bacau Sa, Manpel Tg Mures, UPS Govora and Sinteza Oradea plants. During the privatization governmental subsidies are granted to particularly problematic sectors, such as the mining sector, but these are not accompanied by any requirements to introduce cleaner technologies.

New industrial facilities need to obtain an environmental permit, which is part of the EIA procedure. According to amended Ministerial Order No. 125/1996 for approving the assessment of environmental pollution, the amount and the sources of industrial waste generated at industrial facilities are identified through an environmental 'diagnosis', which is part of the environmental study (See Chapter 1). In existing industrial enterprises, environmental auditing has not yet been introduced. Small and medium-size industrial enterprises do not have any waste monitoring system. Large enterprises have their own systems covering air, water and waste monitoring, but their functioning and reliability are questionable. There are no specialized bodies nor standard laboratories to promote the introduction of ISO 14000 standards. Neither the Ministry of Industry and Mineral Resources nor any of the industries are working on this.

A positive development is the establishment of the Romanian Cleaner Production Centre (RCPC) hosted by the Polytechnic University of Bucharest. in 1999. It is an academic centre and offers training, research and education to all the interested parties from the Government to the private sector. The aim of the Centre is to improve the efficiency of enterprises and, in the long run, to reduce industrial pollution, including the generation of waste.

From 1995 to 1999, about 5.8-6.9 million tons of municipal waste were generated each year, most of this waste being municipal waste from villages (Table 8.1). This means that about 276 kg of municipal waste are generated per capita per year, a value that falls into the average range for the countries in transition (Figure 8.1). Urban areas generate about 0.5-0.9 kg of municipal waste per capita per day, i.e. 8,700 tons per day in all.

Municipal waste consists of household waste (81%); street waste (12%); sludge from waste-water purification (9%) and non-identified waste (4%). Municipal waste includes papers, textiles, food scraps, plastics, metals, glass, stones, ceramic, broken appliances, etc.

The average composition of *household waste* is as follows:

- Paper and cardboard: 16%;
- Glass: 6%;
- Metals: 5%;
- Plastic materials: 11%;
- Organic waste: 39%
- Textiles: 6%;
- Other components: 17%.

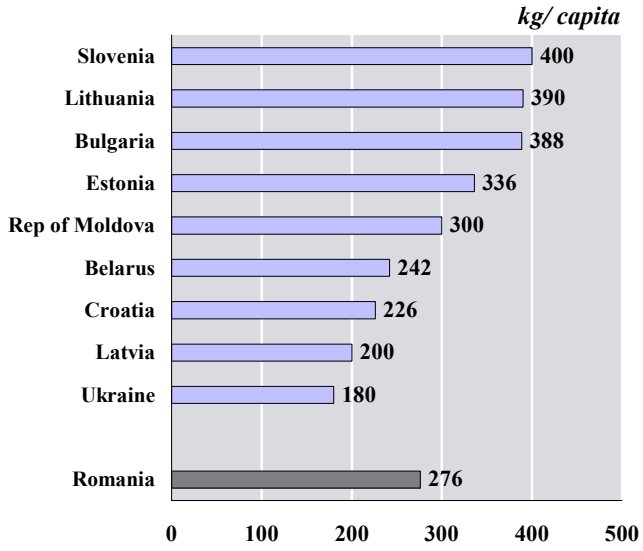
In 1999 about 7,200 tons of medical waste was also generated (Table 8.3).

8.2 Treatment, recycling, separation and disposal of municipal and industrial waste

Municipal waste

The disposal of municipal waste is a real problem in Romania. Almost all municipal waste is disposed of at landfill sites. According to the data from the National Research and Development Institute for Environmental Protection, there are more than

Figure 8.1: Municipal waste generation in selected countries, mid-1990s



Source: EPR, various issues.

1,250 landfill sites for municipal and industrial waste. They cover 13,222 ha and have an overall capacity of more than 9,600 million m^3, which is sufficient for another 10 to 15 years. There are no (or very few) facilities for sorting, processing and recycling municipal waste in Romania. Only glass bottles are sorted and collected separately, and used for the production of brown glass. About 60% of the landfills are for municipal and industrial waste disposal; 30% of the landfills are used for municipal waste disposal only and 10% for sludge from waste-water purification plants. Most landfills are situated outside residential areas and away from watercourses, though 6% of the landfills are near surface waters and 7% are situated in residential areas. About 80% of the landfills are relatively small (0.5-5 ha), but 20% are large and used for the disposal of waste from big cities. For example, the "Glina" landfill site for Bucharest occupies 110 ha.

In 1999, 303 landfills, i.e. 26% of all landfills, occupying about 1,236 hectares, were monitored. There are no risk evaluation studies for landfills and only 10% of them have a permit. When a landfill is to be closed, its environmental 'diagnosis' is prepared in the same way as for an enterprise that is being privatized. More than 40% of landfill sites for municipal waste disposal breach sanitary and hygiene norms and standards. Landfills do not have any insulating plastic lining to protect groundwater against the leaching of hazardous substances. They are major sources of surface and groundwater contamination, especially industrial waste landfills that release heavy metals and organic chemicals. Other adverse effects of waste landfills are the contamination of surface and groundwaters in the Danube River basin as nutrients and toxic substances seep into the soil. In few cases is waste covered by a layer of earth at landfills. At "Glina" there are only 10 bulldozers and two workers involved in waste disposal at the site. Virtually none of the landfills have drainage systems or their existing equipment is obsolete or faulty.

The disposal of municipal waste together with industrial waste at uncontrolled landfills results in the evaporation of toxic organic substances, soil contamination and the creation of unhygienic epidemiological conditions in the vicinity. This also affects human health and results in the deterioration of the biodiversity of the ecosystems in the vicinity of waste disposal sites.

Villages are rarely covered by any municipal waste management service and they have no landfills that meet environmental requirements. In Bucharest, four enterprises carry out the collection, transport and disposal of municipal waste. The REMAT enterprise collects industrial waste that can be recycled or reused.

In 2000 about 1.3% of municipal waste was incinerated. There are no facilities for municipal waste incineration on an industrial scale. There are only few pilot incinerators with a capacity of up to 0.5 tons per hour without power generation. In spite of the large share of organic substances in municipal waste the incineration is not economically feasible for energy production because of its high water content. Bucharest, Craiova, Iasi, Temisoara and Constanta have only pilot plants for municipal waste incineration. Medical waste is incinerated and its final residues and ashes disposed of (Chapter 14).

There is a need for more information (special brochures and other material) and training services to explain the importance of sorting and recycling municipal waste to the public. For example, special TV programmes are needed, as are educational programmes on waste management in schools and universities.

Industrial and hazardous waste

Most industrial waste is disposed of either at landfills together with municipal waste or stored separately on industrial premises. Only 10% of landfills are authorized to accept industrial waste while the other landfills accept so without any authorization. Most landfills are situated in the counties of Alba, Gorg, Hunedoara and Vilcea. Most do not have any protection layer or monitoring system and represent real sources of air, soil and groundwater contamination. According to official sources, some industrial landfills do have a waterproof system or drainage, safety gutters and monitoring wells.

There are 83 landfills for the disposal of hazardous waste located in 30 counties. The biggest are Uzinele Sodice Govora pond (168 ha); Sidex Galati landfill for ash and slag (100 ha); Upsom Ocna Mures pond (92 ha); and Turnu SAT r. Magurele landfill (62.3 ha).

The storage of hazardous industrial waste at industrial facilities or uncontrolled landfills contaminates the industrial facilities and their vicinity. It pollutes the air and the groundwater and has an adverse impact on workers' health. There are stocks of outdated pesticides and cyanide waste originating from the Suceava industrial accident, and non-identifiable reagents in research institutions. A foreign company will neutralize this waste and rehabilitate the storage area, in accordance with a government decision. There is little information on the occupational health of workers dealing with the treatment and disposal of waste, especially hazardous waste (See Chapter 14). Romania does not have the capacity to manage (incineration) these stocks and resources are too scarce to solve these problems in the short term. The development of adequate legislation, research into hazardous occupations, instruments to measure occupational exposure and a wider use of experience gained in EU countries are needed to fully define the real impact of improper waste management on human health.

Recycling, recovery and reuse

According to the NEAP, some 12 million tons of industrial waste, including mining waste, was recycled or used as secondary raw material in other industries in 1998. But only 35% of the recovered materials were actually traded. According to the National Commission for Recycling Materials, the main products recovered from waste in 1997-1999 were steel, copper, aluminium, lead, zinc, paper, glass, plastics and textiles (Table 8.4). Between 1997 and 1999, the quantities of recovered copper, aluminium and lead increased. For some products, like paper and cardboard, recovered quantities were stable (about 117,000 tons) while quantities of textiles and glass fell. As can be seen from Table 8.1, the share of recycled or reused waste slightly increased between 1995 and 1999. About 100 companies use or recycle waste. Sidurgica SA Hunedora, Cost SA Targoviste and Industria Sarmei SA campia Turzii reprocess ferrous waste. Metrom SA Brasov and Neferal SA Bucuresti reprocess non-ferrous waste. Petrocart SA Piatra Neamt; Vrancart SA Focsani and Celohart SA Zarnesti reuse waste paper. Finally, Chimica SA Orastie reprocesses plastic waste. The company RECOMAT is affiliated to the International Recycling Bureau in Brussels.

Thermal power plants in Romania use mostly coal as an energy source, which results in the generation of huge quantities of ash and slag. According to the National Research and Development Institute for Environmental Protection, 6,443,000 tons of ash were generated in 1999. At present about 3% of the ash and slag is used in the cement industry, for road construction and for the production of bricks. As Romanian coal is rich in aluminosilicates with high adsorption capacities, its ash is suitable for the production of building, construction and road materials as well as for the aluminium industry.

Table 8.4: Main industrial output, 1997-1999

Tons

	1997			1998			1999		
	Industrial production	From recovered waste		Industrial production	From recovered waste		Industrial production	From recovered waste	
		Total	*of which:* Export		Total	*of which:* Export		Total	*of which:* Export
Steel *(10^3 tons)*	6,675	3,241	241	6,336	3,136	786	4,354	3,024	1,324
Copper	23,000	6,874	-	21,000	18,597	12,277	29,294	29,217	23,129
Aluminium	164,000	16,503	-	175,000	21,746	4,242	174,598	37,332	19,872
Lead	13,000	8,487	-	15,000	10,964	1,457	17,462	13,604	5,222
Zinc	30,000	7,557	-	29,000	7,357	-	28,695	7,174	-
Paper-cardboard	330,000	115,896	-	306,000	116,709	-	300,727	117,385	273
Glass	335,000	34,064	314	315,000	31,000	-	227,459	22,800	5,177
Plastics	89,000	6,230	-	77,000	77,000	-	67,400	5,500	712
Textiles	117,270	11,730	-	95,450	9,540	-	78,724	7,870	1,778

Source: National Commission for Materials Recycling.

Table 8.5: Characteristics of radioactive waste treatment plant

Type of waste	Storage capacity (Total)	Present storage status	Maximum activity	Maximum annual storage increase
Low-level aqueous	2 x 300 m^3	~40%	37 MBq/m^3	10^3 m^3
Low-level solid	20 m^3	3 m^3	37 MBq/m^3	10^3 m^3
Intermediate level	200 m^3 (shielded drums)	12	Equivalent to surface dose rate of 2 mSv/h	70 (shielded drums)
Spent sources	3,000	40	370 TBq (10^4 Ci)	400
Fire detectors	~10^5	16,908	1.85*10^7 Bq	104
Neutron sources	~100	18	Not established	20
Conditional package	3,000	800 (shielded drums)	Conforms with operating licence	400

Source: Radioactive waste treatment plant (STDR - IFIN - HH).

Radioactive waste

At present the Radioactive Waste Treatment Plant (STDN-BNFL Engineering Ltd) is the main facility for the treatment of radioactive waste (see Table 8.5). The National Commission for the Control of Nuclear Activities has developed a strategy that also includes the management of radioactive waste as one of its policy objectives.

The types of radioactive waste that are treated at the plant include low-level liquid and solid radioactive waste, intermediate-level waste, used radioactive devices, fire detectors, neutron-containing waste and packaging (corroded drums). The treatment of liquid waste consists in chemical precipitation, followed by evaporation and polishing through an ion exchange resin column. The radioactive sludge from the chemical treatment of radioactive liquid waste, the concentrate from evaporation and the ash from incineration are homogeneously mixed with cement and then poured as concrete into 220-litre drums.

Solid radioactive waste is collected in 100 and 220-litre drums. It is incinerated, exhaust gases are

filtered and the generated ash cemented. The 220-litre drums are closed, numbered, marked as low-level liquid waste with their radiation dose after the treatment, registered and transported to the National Repository at Baita Bihor. The capacity of the treatment plant is 1,500 m^3 of low-level liquid waste and 100 m^3 of low-level solid waste and shielded drums for intermediate waste. From 1974 to 1997 the plant treated about 25,000 m^3 of low-level liquid waste, 2,000 m^3 of low-level solid waste and 3,500 used radioactive devices, which resulted in 5,300 conditioned drums. The volumes and types of radioactive waste received by the plant from 1996 to 1999 are shown in Table 8.6. The volume of liquid and solid radioactive waste declined sharply from 1996 to 1999, which also indicates a decrease in the activities generating this waste.

There is a temporary storage site for radioactive waste at the plant. It is situated on the ground floor and consists of 1,000 m^2 divided into five rooms. Total capacity is about 3,000 drums. At present, about 800 drums are stored. Moreover, a national repository operates under the responsibility of the Ministry of Research and Technology. There is no maintenance of this repository once the radioactive waste is deposited. The repository was an open uranium ore pit until 1985. The plant has been operating for 25 years, and the national repository for 15 years. The equipment is outdated and needs replacing at both facilities. The plant and the repository for radioactive waste should be completely modernized.

Contaminated waste sites

Many waste sites at chemical, mining and metallurgical facilities are contaminated by heavy metals, chloro-organic compounds, acids and cyanic substances. Many industrial facilities that were shut down are now highly contaminated areas used as storage facilities for industrial waste. For example, the chemical plant in Ploiesti closed down and its site is used to store industrial waste (pyrites ash from sulphuric acid production and phosphogypsum from phosphoric acid production). Similar situations exist in Borzesti-Onesti, Bacau, Brasov, Isalnita, Pitesti, Govora, Suceava, etc.

The most adverse impact from contaminated sites is on agriculture. The Ministry of Waters and Environmental Protection considers that immediate action would be needed to clean up 960,000 ha of farmland and 50,000 ha of forests. The following hot spots should be mentioned: Baia Mare, Zlatna

Table 8.6: Volumes and types of waste received by radioactive waste treatment plant, 1996-1999

Radwaste type	1996	1997	1998	1999*	Methods processing
Solid LLW	6 m^3	3 m^3	3 m^3	5 m^3	Compaction, incineration, shredding, cementation
Solid ILW	27 m^3	19 m^3	20 m^3	6 m^3	Direct cementation in shielded drums
Liquid LLW	385 m^3	440 m^3 (with internal)	143 m^3 (without internal)	60 m^3 (without internal)	Precipitation, evaporation, cementation
Liquid ILW	15 m^3	8 m^3	3 m^3	6m^3	Direct cementation in shielded drums
Fire detectors (^{241}Am)	4,618	2,369	2,772	7,149	Interim storage (until processing)
Neutron sources (Am-Be, Ra-Be, Pu-Be)	1	2	-	15	Method will be completed and licensed
Spent sources	131	118	51	193	Direct cementation

Source: Radioactive waste treatment plant (STDR - IFIN - HH).

* January-September 1999

and Copsa Mica, which are contaminated by heavy metals (Cu, Pb, Zn, Cd, etc.); Borzesti-Onesti (Bacau) and Ploiesti are polluted by oil and salt water. So far no action has been taken to clean up these sites. In 31 counties work is on the way to clean up contaminated areas.

8.3 Legal instruments and institutional arrangements

Legislation

Romania now has a framework law on waste, Law No. 426/2001. The Law on Environmental Protection (No. 137/1995) also contains provisions on waste management. It obliges the owners of industrial facilities to ensure environmentally sound waste management.

The new Law covers hazardous waste management and transport (in line with annexes 8 and 9 to the Basel Convention and EU Directive 253/1993 about the shipment of waste), and the respective obligations of all actors involved in waste generation and management. It calls for a national strategy on waste and a national action programme. Local waste management plans will be requested and integrated by the MWEP into a national management plan. A new licensing system for the regulation of waste will be compulsory for all waste producers; it will be part of an integrated permit. By the end of 2001 a government decision on landfills will be taken, as will a government decision on incineration.

However, the new Law on Waste does not cover the management of waste generated in the mining and military industries. So a special law must be passed for this waste and regulations drawn up to set the standards, norms and conditions for the implementation of the Law in order to improve overall waste management.

In addition, the Government has adopted several other decisions and ordinances on waste management:

- Government Decision No. 340/1992 concerning the import conditions for waste and residues of any nature as well as other dangerous goods;
- Government Ordinance No. 33/1995 approved by Law No. 137/1996 concerning measures for the collection and recycling of reusable waste;
- Governmental Decision No. 155/1999 for the introduction of waste management records and the European Waste Catalogue;
- Law No. 6/1991 on Accession to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The report of 2000 on the progress made in the transposition and implementation of EU legislation shows that only about 15% of waste legislation has been transposed. The enforcement of the main directives on municipal and industrial waste management (such as the Waste Framework Directive (75/442/EEC) as amended by 91/156/EEC; the Hazardous Waste Directive (91/689/EEC) as amended by 94/31/EC; the Packaging Waste Directive (94/62/EC); the Directive on New Municipal Waste Incineration Plants (89/369/EEC); the Hazardous Wastes Incineration Directive (94/67/EC) and the Sewage Sludge Directive (86/278/EEC)) is not expected before 2015-2020.

To help align its legislation on waste on EU directives, Romania has twinning arrangements with Germany. The twinning programme covers the development of draft legislation for transposing directives on landfills, the disposal of waste oils, hazardous waste incineration, the disposal of PCBs and of batteries and accumulators containing dangerous substances and regulations on the shipment of waste.

Institutional arrangements

A Division for Waste and Hazardous Chemicals Management was set up in the MWEP at the beginning of 2001 within the same general directorate that deals with regulations and permits. The new division will deal with the technical reports that are necessary for obtaining a permit. The National Research and Development Institute for Environmental Protection (ICIM) is responsible for research in industrial and municipal waste management, including the development and the implementation of policy and programmes as well as the collection and analysis of information on the safe management of waste, its generation, storage, recycling and disposal and the setting up of a waste data bank. The municipalities are responsible for the collection and disposal of municipal waste. Responsibility for hazardous waste is split between the Ministry of Waters and Environmental Protection, the Ministry of Industry and Resources and the Ministry of Health. Local Environmental Protection Inspectorates (EPIs) are the main body for the inspection of companies' own monitoring systems.

The National Commission for Recycling Materials under the Ministry of Industry and Resources is the main organization that promotes waste recycling, waste recovery and its use as secondary raw material. The functions of the Commission include:

- Drafting environmental legislation and regulations in cooperation with the Ministry of Waters and Environmental Protection as well as verifying the implementation of such legislation and regulations;
- Developing and implementing the strategy and policies for waste recycling, recovery and reuse, excluding hazardous waste (which is the task of the National Research and Development Institute for Environmental Protection);
- Providing technical, financial and administrative assistance to promote environmentally sound recycling and recovery of waste, including technological details of processes used;
- Developing research programmes for waste recycling methods and technologies;
- Authorizing and inspecting the recycling of industrial waste by industrial enterprises, including packaging materials;
- Collecting data and maintaining a special information system on waste recycling and reuse;
- Promoting fruitful cooperation between enterprises, professional associations, trade unions, the mass media and NGOs to improve waste recycling and reuse:
- Organizing exhibitions, trade fairs, seminars, etc. to bring together all interested partners in waste management.

Monitoring of waste

In the framework of the National Integrated Monitoring System there is a section on waste monitoring which covers data on industrial and municipal waste. The system was created in 1999 when the European Waste Catalogue started to be applied. It was introduced by the Government Decision on Inventory and Evidence of Waste (1999). It obliged waste generators to record and report their waste. A list of the biggest generators was established at local level. The data on industrial waste include information on the quantities of waste that are generated, recycled, disposed of or incinerated as well as on industrial landfills or disposal sites (i.e. their location, surface, capacity). The data on municipal waste cover the quantities and types of waste (household, street, sludge, industrial waste with municipal waste); treatment methods (if any); means of transport and also information on landfills for industrial waste. The data are collected by the local EPIs and transmitted to the National Research and Development Institute for Environmental Protection, which works together with the National Institute for Statistics. However, today the waste indicators are not the same as those used by the EU and other international organizations and need to be adjusted.

Economic instruments

The charges for the generation, collection and disposal of municipal and industrial waste are described in Chapter 3. It should be noted that there are no charges for the disposal of hazardous waste. The industrial enterprises are responsible for the disposal of the hazardous waste they generate. As mentioned above, there are no appropriate control systems for the industrial waste disposal sites. There is a lack of investment in industrial waste management from both the State budget and enterprises in order to organize environmentally sound disposal. So far the environmental fund has not been established and, therefore, there is no money available for waste management projects, except from the State budget, which is very limited. There are no economic incentives from the State to introduce cleaner production technologies in industry. (See Recommendation 3.4 in Chapter 3).

The only economic inducement in waste management is that taxes on imported equipment are reduced if the equipment is used for environmental technologies, including the reprocessing or minimization of industrial waste.

8.4 Policies, measures and projects

Policy objectives

The policy objectives for municipal and industrial waste management, including for hazardous waste, are formulated in the Medium-term National Strategy for Economic Development and the Strategy for Environmental Protection 2000-2004 and in the National Environmental Action Plan 1999 (NEAP). The NEAP has a subsection on the management of municipal and industrial waste. The National Commission for Recycling Materials is developing a national strategy for the recycling of industrial waste in cooperation with the ministries concerned. This strategy will cover all industrial sectors generating waste. It will be used to develop

a special programme to increase waste recycling instead of waste disposal.

The policy objectives for waste management that are addressed in the above documents and in the national legislation can be summarized as follows:

- To develop and implement legislation and regulations on waste management in line with EU legislation;
- To develop a new or improve the existing institutional structure for waste management;
- To increase the reuse and recycling of industrial waste and industrial waste water up to 10-15%;
- To increase the recycling of paper, glass, plastics and used tyres up to 20-30% by 2004;
- To organize the environmentally sound management of waste from transport activities;
- To reduce the risks posed by hazardous chemical waste;
- To clean up contaminated waste sites -- both industrial and municipal abandoned landfills;
- To improve the collection and sorting of municipal waste and organize its environmentally sound disposal;
- To increase the number of people served by municipal waste collection;
- To meet standards and norms for municipal landfills and industrial waste disposal sites and monitor them;
- To build facilities for industrial hazardous waste treatment and organize a control system for its generation, treatment and disposal.

To minimize waste generation at source and implement the principles of sustainable industrial development, there are other policy objectives, including the following:

- To modernize industrial installations so as to minimize the generation of waste during technological processes;
- To develop and introduce cleaner production and cleaner processes in industry as well as develop a technical cleaner production centre;
- To use mineral fertilizers and biodegradable pesticides, herbicides and other chemical substances in environmentally friendly ways according to existing international norms and standards;
- To develop a financial mechanism and apply economic incentives to reach the above policy objectives.

Considering the residues from the burning of coal, the policy objectives for the use of ash and slag are:

- The further development of the processes for wet and dry ash transport according to standards and technical requirements, taking into account the coal's characteristics;
- The modernization of power plants with the introduction of processes for ash and slag reuse;
- The development and implementation of regulations, including financial mechanisms, which promote the use of ash and slag;
- Bringing together companies involved in recycling and thermal power plants that generate ash and slag.

Increasing the quantities of waste that are used as secondary raw material is also the subject of a series of planned measures. For instance, the aim is to:

- Considerably increase the recycling, recovery and reuse of industrial waste by introducing new industrial processes and technologies and extract valuable components from waste or use them as secondary raw material;
- Improve the treatment and environmentally sound disposal of industrial waste that cannot be recycled or reused;
- Monitor the vicinity of industrial installations and industrial waste disposal sites according to international environmental norms and standards;
- Improve overall reporting on waste generation, recycling and disposal, including its processing and analysis.

Waste management projects

The NEAP contains 5 projects subdivided into 56 sub-projects on industrial and municipal waste management in different counties. They are:

- The construction of environmentally sound landfills for municipal and industrial waste disposal in 19 cities and towns;
- The construction of environmentally sound landfills for municipal and industrial waste disposal in 7 different zones;
- The construction of environmentally sound landfills for industrial waste disposal at 14 different sites;
- The treatment and disposal of hazardous waste at 7 treatment and disposal facilities;

- The treatment and incineration of medical waste at 8 locations.

Other specific waste management projects that should be mentioned are:

- The improvement of hazardous waste management at Petrotel Lukoil;
- Putting into operation a hazardous waste incineration at Oltchim Ramnicu Valcea, including a cost-benefit analysis;
- The prevention of groundwater contamination from phosphogypsum ponds at Fertilchem Navodari and Sofert Bacau;
- The improvement of the ash and slag at Conel CET and Sidex Galati so that they can be disposed of or reused in an environmentally sound way.

The Institute of Power Studies and Design is carrying out two projects: an ecological dump for domestic waste and a risk assessment and feasibility study for an ash and slag dump. The first project aims at the environmentally sound management of municipal waste in Bistrita. It includes the installation of lining and a drainage system at the landfill site, site monitoring, separation and recycling facilities for waste, and waste-water pretreatment. The second project concerns the identification of risks from the Brasov landfill, which receives slag and ashes from thermal power generation plants. The main objective of the project is to prevent water pollution and the leaching of polluted water into the environment from the landfill.

Under the twinning investment programme with Germany, the following projects are planned:

- Development of recommendations concerning investment planning and the use of economic instruments for waste management;
- Development of a waste database;
- Development of a public education and training programme;
- Development and implementation of cooperation plans between the national environmental authorities (for instance, between the National Commission for Recycling Materials and the local/regional administration).

In the framework of ISPA, projects for the environmentally sound management of municipal waste (collection, transport, sorting, disposal) will be carried out in 25 municipalities. One project financed by the EU (70%) and a local budget (30%) started in 2000 (Piatra Neamt by the Danish EPA). There are other projects on municipal waste management with USAID (manual for inspections and assistance for law-making).

In the framework of the Kyoto Protocol there is a project for the rehabilitation of open municipal waste landfills based on the production and use of methane. The Unit for the Kyoto Protocol Mechanisms Implementation, which was established in July 2000, will carry out the project.

8.5 Conclusions and recommendations

Waste management is a high priority and an important area for further activity in Romania. The improvement of existing systems and practice in waste management as well as the development and implementation of new policy objectives are needed to build the overall environmental capacity and improve the quality of the environment and the population's living conditions.

The introduction of cleaner production technologies and the use of the best available techniques are the cornerstones of positive changes throughout industry. They should also be efficient in minimizing waste at the source. At present, there is no strategy for industrial sustainable development that would reduce waste at source and recycle it to reduce the use of natural resources and mitigate its adverse effects on the environment. It is expected that Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC) will be introduced by 2003 in Romania and will lead to cleaner production. The introduction of cleaner production technologies has a positive effect on industry as a whole. It helps improve the environmental performance of plants and national and international economic competitiveness, resulting in an improvement in working conditions and an increase in the technical knowledge of the operators. At inception, the implementation of concrete pilot or full-scale projects through cleaner production centre(s) is in general a useful step in that direction. It might be helpful for Romania to seek the cooperation of UNEP and UNIDO, which are efficiently helping countries in transition to start up such centres, bringing together knowledge, experience, a network of specialists and a database on technology exchange.

Recommendation 8.1:
The modernization of industry, the introduction of cleaner production technologies during the privatization process and the implementation of the principles of industrial sustainable development should be promoted by the Government and industry over a long-term period. This involves:

- *Further developing the appropriate legal and regulatory bases to encourage industry to use cleaner production;*
- *Introducing economic incentives and instruments for this purpose, including financial resources;*
- *Further developing the institutional framework, in particular cleaner production centres;*
- *Creating favourable conditions for transferring cleaner production technologies from other countries when there is no domestic alternative.*

Almost all municipal waste is disposed of at landfills. There are very limited or no facilities for the separation, sorting, treatment and recycling of municipal waste. Most landfill sites for municipal waste disposal breach sanitary and hygiene norms and standards. Landfills do not have any insulating plastic lining to protect groundwater against the leaching of hazardous substances. Virtually none of the landfills have a drainage system or existing equipment is obsolete or faulty. At present about 1.3% of municipal waste is incinerated. There are no facilities for municipal waste incineration on an industrial scale.

The following urgent measures to improve municipal waste management are necessary:

- Conducting feasibility studies on the environmentally sound disposal of municipal waste;
- Using or adapting existing international norms and standards to municipal waste treatment and disposal;
- Implementing monitoring systems for municipal waste landfills (quality control of groundwater, soil and air in the vicinity of landfills);
- Organizing separate collection. Recycling valuable materials from municipal waste (paper, glass, plastics and plastic packages) and increasing the recycling of used tyres, batteries and waste oil.);
- Integrating the municipal waste management system into national economic activities and recovering land used for municipal waste disposal;
- Launching education programmes on the separate collection of municipal waste for the population in order to improve the amount recycled;
- Introducing an environmentally sound municipal waste management system in rural areas as a component of overall sustainable development to improve the living standards of the rural population;
- It should be mentioned that municipal and industrial waste is not dumped in protected areas; it is transported to landfills outside of these zones.

Recommendation 8.2:
Under the guidance of the MWEP, the local governments together with the local EPIs should:

- *develop and set up an infrastructure for improving the overall municipal waste management system, including the collection, separation, recycling and environmentally sound disposal of municipal waste; provide special means for the separate collection of municipal waste (bags, containers) to the public; build facilities for the reprocessing of separated waste;*
- *assess through environmental impact assessment the state of existing landfills and evaluate a clear phase-out strategy for old landfills, including the use of economic instruments to support it;*
- *assess the environmental impact of building new landfills and maintain them according to the requirements of environmental safety and standards, including monitoring;*
- *raise public awareness and use educational and training programmes through all the mass media to encourage municipal waste reduction.*

The recycling or reuse of industrial waste is a real problem that should be solved at national, regional and local levels. Most industrial waste is dumped at landfills together with municipal waste or stored separately at the industrial facilities. Some landfills are equipped with a waterproofing system or drainage, safety gutters and monitoring wells. The Government and industry have made considerable efforts to increase the recycling and use of waste as secondary raw materials. However, at present the share of recycled or reused waste is very small.

Special developments are required for the reprocessing of ash and slag from thermal power stations.

Recommendation 8.3:
The Ministry of Industry and Resources in cooperation with the Ministry of Waters and Environmental Protection and industrial enterprises should improve and develop overall industrial waste management systems at local, regional and national levels which should include the following:

- *An increase in industrial waste recycling, recovery and reuse by introducing new processes and new technologies into industrial facilities;*
- *Improvement in the treatment and environmentally sound disposal of those industrial wastes that cannot be recycled or reused;*
- *The modernization of thermal power plants with the introduction of processes for the reuse of ash and slag;*
- *The creation of mutual interests between companies involved in the recycling and reuse of industrial waste, including economic and financial incentives.*

At present in Romania the Radioactive Waste Treatment Plant (STDN-BNFL Engineering Ltd) is the main facility for the treatment of radioactive waste. The plant treats low-level liquid waste, low-level solid waste, intermediate-level radioactive waste, used radioactive devices, fire detectors, neutron sources and corroded drums. After the treatment waste is cemented and put in 220-litre drums, which are closed, numbered, marked with the dose, registered and transported to the national repository at Baita Bihor. The plant has been operating for 25 years and the national repository for 15 years. Existing technologies and equipment are outdated and need replacement and modernization in order to continue operations at both facilities.

A series of measures should be taken over the short and medium term, including:

- improvement in the overall technical maintenance of the STDN in order to meet the International Atomic Energy Agency (IAEA) and EU standards and norms;
- the replacement of obsolete equipment and damaged waste drums and the installation of a strict, technologically appropriate measure and control system with modern computers and tools;
- further continuation of the research and development of new methods of radioactive waste treatment and disposal at national and international levels with the cooperation and technical assistance of IAEA and EU PHARE.

Recommendation 8.4:
The National Commission for the Control of Nuclear Activities in cooperation with other parties should take urgent action to achieve the overall technical modernization of the radioactive waste treatment plant and the national repository to improve their operational performance and meet IAEA and EU standards and norms.

Waste management legislation is under development in Romania. The Law on Environmental Protection (No. 137/1995) contains provisions on waste management. The main piece of legislation on waste management is Law No. 426 regarding Waste Management adopted by the Government in 2000. The Government has also adopted several decisions and ordinances on waste management. At present the development of a set of waste regulations is urgent and necessary to speed up the implementation of national laws and the Basel Convention. Regulatory documents should contain norms, standards, guidelines and other normative acts according to existing norms and standards used by EU countries in view of the overall harmonization of national legislation with EU legislation.

Recommendation 8.5:
The Ministry of Waters and Environmental Protection in cooperation with other ministries and institutions should speed up the development of waste management regulations in order to implement existing legislation that complies with EU legislation, and create economic and financial mechanisms to enforce them.

There is no national waste strategy at present and no waste management programme. The policy objectives of municipal and industrial waste management, including hazardous waste management, are scattered throughout various governmental documents and the 1999 NEAP. The NEAP includes a national Programme for municipal and industrial waste management. A sectoral strategy for industrial waste recycling has been developed by the National Commission for Recycling Materials in cooperation with the

ministries concerned and covers all industrial sectors generating waste. These policy objectives have inspired many concrete projects on waste management. Now the development of a financial mechanism and the use of economic incentives for the implementation of these programmes are strongly needed. They should be contained in the future national strategy on waste management that is being drafted.

Recommendation 8.6:
The Ministry of Waters and Environmental Protection in cooperation with the Ministry of Industry and Resources and all institutions and private and governmental bodies dealing with waste management should seek all possible ways to attract financial and other resources at local, national and international levels for the implementation of national programmes and projects.

The problem of waste management particularly affects small and medium-size enterprises and small and medium-size municipalities. The reasons are similar: they do not have specialized technology, modern management and financing skills at their disposal. They are not sufficiently well organized in industrial or municipal associations to formulate their goals and strategies and to acquire the necessary skills and means. In short, they are not a strong enough interest group in the field of waste management. Small and medium-sized municipalities need stronger fiscal or budgetary roles, and small and medium-sized companies need access to credits, and management or technical advice. Moreover, individually these enterprises and municipalities cannot make use of economies of scale, which can be considerable in waste separation, collection, transport and disposal, or any other form of decommissioning.

Recommendation 8.7:
The Ministry of Public Administration, the Ministry of Development and Planning together with the Ministry of Waters and Environmental Protection, in cooperation with the municipalities and regions, as well as their associations, should promote inter-municipal cooperation for a more cost-efficient management of municipal waste. The Ministry of Industry and Mineral Resources, together with the Ministry of Waters and Environmental Protection, should promote the involvement of business associations and industrial associations in the management of industrial waste from small and medium-sized enterprises.

Chapter 9

NATURE AND BIODIVERSITY CONSERVATION

9.1 Current state of nature

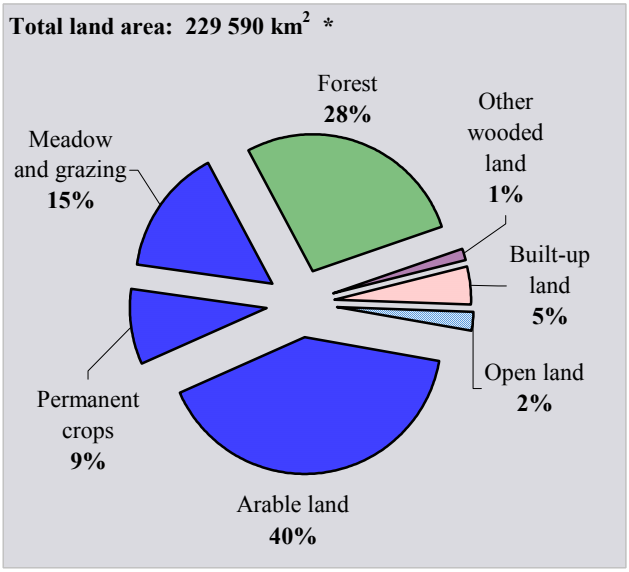
Landscapes and ecosystems

In addition to the typical features of its geography, climate and relief (See Introduction), Romania has a large variety of geological substrates of different age and origin. Very old formations like different schists from the Proterozoic (Precambrian) era and granites of the Paleozoic age, up to very young formations like alluvium deposits in the Danube delta are representative of Romania's geological structure. Limestone bedrock and karst regions with different karst forms and numerous caves are also common in Romania.

Due to its composite geology, Romania has a great variety of soil types and soil subunits (Chapter 11). Chernozem soils underlie Wallachia, the Moldavian tableland, the western plain and other flatlands, while hilly and mountain forest areas are characterized mostly by brown forest soils. There are also other soil types like podzolized soils, chestnut soil, solonchak, solonetz, grey soil, psammosol and alluvial soil.

The bio-geographical position of Romania (a meeting point of different bio-geographical systems from north, east, south and west), as well as its geology and pedology, relief and cultural history, result in a high diversity of landscapes and ecosystems. In total 52 eco-regions can be found in Romania, with a large diversity of terrestrial and aquatic ecosystems specific to the coastal and littoral zone of the Black Sea, e.g. steppe, forest steppe, hill, mountain, dry areas, wetlands (including the Danube delta, rivers and lakes).

Figure 9.1: Land use, 1998



Source: Romanian Statistical Yearbook 1999.

* Excluding water areas.

Natural and semi-natural ecosystems represent 47% of the whole territory. The larger part of Romania's nature is well preserved especially mountain forests and wetlands. Romania has the largest virgin forests in Europe. Mountains, hills, flatland, wetlands and coastal landscapes represent complexes of natural, semi-natural, secondary natural, agricultural and other anthropogenous ecosystems in different proportions. Mountain forest areas and the alpine zone are the most natural landscapes owing to their very limited accessibility.

In total 17 major terrestrial ecosystem formations exist in Romania including all of Europe's major ecosystems. These are boreal coniferous forests with 41 ecosystem types, mesophilous, hygrophilous and xerothermic broadleaved forests with 110 ecosystem types, different grassland ecosystem formations with 560 ecosystem types and different shrubby ecosystem formations with 47 ecosystem types. There is also a rich diversity of aquatic ecosystems including mountain springs and rivers, river floodplains, glacial lakes, coastal wetlands, bogs and others.

Studies from the CORINE Biotope Programme identified 783 habitat types: 13 coastal habitats, 89 wetlands, 196 grasslands, 206 forests, 54 marshes, 90 rocky/sandy and 135 agricultural habitat types.

Forests

Forests (6.3 million ha) and wooded lands (0.3 million ha) make up 28% of the country's total territory (see Figure I.2). This percentage is smaller than the European average of 30-40%. The forests in Romania are not evenly distributed throughout the territory. More than half (58.5%) is in the mountains (700 m or more above sea level), 34.8% are in the hilly region (150-700 m above sea level) and only 6.7% in the plains (less than 150 m above sea level). Conifer species represent almost a third of the forest trees (30.8%), and deciduous species 69.2%. The average economic value determined by the wood harvest turnover in Romania's forest may be considered high, since the average density per hectare is around 215 m^3, which ranks it the fourth highest in Europe.

The distribution of the forest types follows the ecological conditions that create zonation. Different species of willows, poplars, ash, plain trees and others (all softwood species represent about 21% of all forests) grow in the floodplains, while thermophilous and xerophilous oaks grow in arid plains. Oak species (in total 19%) predominate in the hilly region, while beech (representing about 30% of total forest species) and conifers above it (mainly spruce and fir) are common in the mountains.

There are a large number of valuable well preserved natural or near natural forests, often covering large areas. This is mainly due to forest inaccessibility, especially in the mountains (the density of the roads is less than 6.5 m/ha). At present about 45% of Romania's forests are regenerating naturally and 55% by planting. Consequently, 15.4% of the forests are mature and 22.5% are younger than 20 years.

While very few data exist on the past state of forests, there is a large amount of data about forest damage (mainly defoliation) during the past ten years. This is due to the well-established forest monitoring system as an integral component of the International Cooperative Programme on Assessment and monitoring of Air Pollution Effect on Forests (ICP Forests). It seems that forests in the plain and hilly region are heavily degraded compared to the better preserved mountain forests.

Forest damage is mainly due to the frequent droughts of the past two decades and less to pollution. According to data from the national network, in 1999, 12.7% of the sample trees were considered damaged (defoliation classes 2-4). The respective shares of coniferous and broadleaf tree species were 9.1% and 14.0%. This situation is classified as 'moderately affected' and was reached only recently as a consequence of favourable hydrological conditions in 1996 and 1997. In the early 90s this percentage was much higher (16%). The most affected species were oaks (*Quercus pedunculiflora* and *Quercus pubescens*) with 33.5% of the trees affected and black locust (*Robinia pseudoacacia*) with 21.1% affected, while Norway spruce (*Picea abies*) with 8.2% affected, silver fir (*Abies alba*) with 11.6% affected, European beech (*Fagus sylvatica*) with 9.9% affected were the healthiest tree species. The state of the mountain forest is better than these average values, owing to better climatic conditions. However, at higher altitudes, pollution has a greater impact on the tree crowns.

The forests in Romania are classified into two groups: forests with special protection functions (52.7% of total forest area) and forests for mainly economic exploitation (47.3%). Forests surrounding cities and other

settlements fulfil recreative functions (Table 9.1). There has been a permanent enlargement of the forest area with special protection functions, from 13% in 1955 to 53% in 1998 and 62% in 2000 as planned.

Species diversity (Flora and fauna)

Due to its bio-geographical position and rich ecosystem and habitat diversity, Romania has a rich flora and fauna. More than 37,500 species have been recorded on the territory, of which 3,700 are plant and 33,802 animal species. There are 600 algal species, but there are no available data on non-vascular plants, lichens or fungal species. Of the animals, 717 are vertebrate species (Table 9.2). The ornithofauna is represented by 364 species, of which 312 are migratory birds.

Romania's flora and fauna are characterized by a high degree of endemic, subendemic, relict and rare species. There are 57 endemic, 171 subendemic and 1,253 rare plant species and more than 1,000 endemic animal species. Cave fauna (including insects) is represented by 227 species (97% of them endemic). Beside invertebrates, vertebrates show high endemism and subendemism at subspecies level (for example: red deer – *Cervus elaphus montanus*, wild boar – *Sus scropha attilla*, European hare – *Lepus europaeus transsylvanicus*, chamois – *Rupicapra rupicapra carpatica*, willow tit – *Parus montanus transsylvanicus*). The main centres for the endemic fauna are on the mountain massifs of Rarau-Giumalau, Hasmasul Mare, Fagaras, Parang, Cernei, Semenic, Almas and Bihor. The status of Romanian species is shown in Table 9.2.

Table 9.1: Function of forests

%

Forest function	1955	1993	2000
Forests with special protective functions	**13**	**50**	**62**
Water protection	3	18	21
Soil protection	7	19	24
Protection against adverse climate effects and industrial pollution	1	3	5
Recreation	2	6	7
Research function, genetic fund and eco-forestry fund protection (protected areas)	1	4	5
Forests with predominantly economic production functions, especially for veneer, wood and timber, cellulose and other resources	**87**	**50**	**38**

Source: Environmental Factors' Report, ICIM Bucharest (http://nfp-ro.eionet.eu.int/soe/)

Table 9.2: Flora and fauna and their status

	Number of species	Endangered		Extinct
		Number	*%*	*Number*
Plants	3700*	39	1.1	74
Invertebrates	33,085	…	…	…
Vertebrates	717	32	4.5	4
Fishes	191	9	4.7	-
Amphibians	20	9	45.0	-
Reptiles	30	6	20.0	-
Birds	364	6	1.7	2
Mammals	102	2	2.0	2

Sources: ICIM Bucharest (http://nfp-ro.eionet.eu.int/soe/); State of the Environment Report, 1999.

Note:

* Of which 171 are vulnerable.

Another asset of Romania's biodiversity is that it can boast many viable and rich populations of different species that are very rare in Europe. Beside many plant species and virgin forests, the largest and healthiest populations of large carnivores in Europe are located in Romania. About 40% of the European wolf population is in Romania, 60% of the brown bear population and about 1,000-1,500 lynxes live in the Carpathians.

The large number of bird species (especially migratory species) results from the fact that east Romania (Moldavia, Dobrodja) is on one of the most important bird migration routes to the south (Greece – Nile valley). Red-breasted goose (*Branta ruficollis*), swans (*Cygnus cygnus* and *Cygnus olor*), black stork (*Ciconia nigra*), pelicans (*Pelecanus crispus* and *Pelecanus onocrotalus*), glossy ibis (*Plegadis falcinellus*) and others use this route. Other east-west routes are used by crane (*Grus grus*) and passerine birds. The Danube delta and the Black Sea coast offer extraordinary resting and feeding places for migrating birds.

This rich biodiversity also has a very high economic value. Fifty-eight species of autochthonous tree species and 30 shrub species are important resources for wood, resin and other industries or as a source of nutrition. Four hundred and twenty-five herb plant species and 29 freshwater fish (including pike, carp, sander, sturgeon and perch) have an important economic value; 12 mammal and 7 bird species are important game species.

Protected areas

There are 827 natural protected areas in Romania, which represent 5.8% of the territory, according to recent Law No. 5/2000 (i.e. section III of the Law on National Spatial Planning). To date, it is hard to get a clear picture of the protection regimes of these areas for several reasons: (1) the law on the protection of natural areas has recently been adopted as an Urgent Ordinance (No. 200/2000) and is before the Parliament to become a law; protected areas listed in the law should now be classified according to the IUCN classification; (2) protected areas are under the jurisdiction of (and consequently are being managed by) two different ministries, the MWEP and the Ministry of Agriculture, Food and Forests for protected forests. Table 9.3 shows the most recent data.

Table 9.3: Protected areas, 2000

	Number	Area *(ha)*
Total	**827**	**232,076**
Nature reserves	693	102,433
National, natural parks and biosphere reserves	134	129,643

Source: Law 5/2000 on National Land Planning Use, MWEP.

Three of the protected areas are in the UNESCO-Man And Biosphere (MAB) Reserves Network: the Danube Delta Biosphere Reserve (since 1990), the Retezat National Park (the oldest national park in Romania, established in 1935 and on the MAB list since 1979) and the Rodna National Park (since 1980).

The designation of the protected areas is made either by the MWEP or by local Environmental Protection Inspectorates (EPIs), depending on the importance of the area (national or local). In both cases, the protected area becomes an integral part of the country's protected areas network. The designation of protected areas was not clear in the period before 1989, and it was not a coordinated process. Thus, protected areas now should be reviewed to see whether their distribution, effectiveness and extent to which they cover the heterogeneity of ecosystems are adequate. The lack of a coordinated network for the large variety of protected areas is a major problem.

The most important action toward the creation of a network of protected areas and biocorridors is the drawing up of a CORINE biotope list. The programme for establishing a Green Corridor for the Danube is a more concrete initiative. The Green Corridor Programme comprises the lower Danube flow and was initiated by Romania, together with the Governments of Bulgaria, the Republic of Moldova and Ukraine. This will be the largest transboundary wetland protection and restoration attempt in Europe. The restoration works include wetlands, lakes, flooded areas, floodplain forests and meadows. The Green Corridor should expand the Danube's natural capacities for pollution reduction, flood prevention and biodiversity conservation. The sustainable use of its bioresources will bring benefit to local populations. The countries involved in this initiative have committed themselves to creating a protected area system along the lower Danube, including the

Danube delta. Initially this system will include about 715,000 ha of existing protected areas, 68,000 ha of new protected areas and 162,000 ha of priority areas for ecological restoration (some of these areas come within the frame of existing protected areas). More than ten projects of ecological restoration have already been started, and another seven are proposed. All of them are exclusively or predominantly financed by international funds.

Wide-ranging action was taken from 1999 onward to set up integrated management plans and create administrative structures in national parks, i.e. concretely implementing protection measures in protected areas. This became possible through project grants from GEF and the European Community. Part of the funds from GEF (together with Romanian funds) were assigned to Retezat National Park - Biosphere Reserve and Piatra Craiului National Park. The Romanian participation in EU LIFE Programme led to eight similar projects being financed.

The Danube Delta Biosphere Reserve

The Danube Delta Biosphere Reserve has a triple status. It has been a World Natural Heritage Site since December 1991 with more than 50% of its territory in Romania (the other parts are in the Republic of Moldova and Ukraine), a Biosphere Reserve within the UNESCO-MAB Reserves Network (since September 1990) and a Ramsar Site (since May 1991). Since 2000 it has been an international protected area (the Ukrainian part was also declared a biosphere reserve).

The Reserve is the largest and the least damaged wetland in Europe with a total area of 580,000 ha. It represents a mosaic of ecosystems: lakes, floodplains, reed bed surfaces, sand dunes, poplar and willow plantations and continental-type forests. One of the most extensive reed bed systems in Europe (180,000 ha) is situated in the Reserve. About 113,000 ha are permanently covered by water (Danube river arms, channels, brackish lakes and Black Sea coast and Black Sea down to a depth of 20 m).

Box 9.1: The Danube Delta Biosphere Reserve

The Danube Delta Biosphere Reserve is the only protected area governed by its own law (No. 82/1993) and recently amended by Urgent Ordinance No. 112/2000 to strengthen its status. Now headed by an Under-State Secretary, it has a staff of 180, including 80 rangers. The Reserve's Authority manages the Reserve according to the management plan. The Authority is supervised by MWEP and closely collaborates with the Danube Delta National Research Institute.

The most important features of the Reserve concerning biodiversity are its large populations of breeding bird species which are endangered or rare in Europe and the large number of endemic animal species in the delta and coastal area. There are seven endangered European bird species, the Pigmy cormorant (Phalacrocorax pygmeus), the Dalmatian pelican (Pelecanus crispus), the lesser white-fronted goose (Anser erythropus), the red-breasted goose (Branta ruficolis), the white-headed duck (Oxyura leucocephala), ferruginous duck (Aythya nyroca) and the slender-billed curlew (Numenius tenuirostris), which can be found in large number in the delta. Furthermore, there are many endemic animal species, including 7 fish species, 4 molluscs, 21 endemic insects, and a considerable number of endemic and subendemic sponges, worms and crustaceans. In total 1,598 plant species (of which 634 are algal, 107 lichen and 779 cormophyte species) and 3,478 animal species (including 2,207 insects, 325 birds, 12 reptiles, 9 amphibians, 42 mammals and 84 fishes - 40 of them freshwater species). The most recent research has enlarged the list of species to 5,514 (1,668 species of flora and 3,846 of fauna).

There are 25 villages and one small town, with a total of 14,800 inhabitants, within the Reserve. The main occupation is agriculture and fishing. The agricultural area is about 80,000 ha, half of which is farmland and half are fishponds. The annual catch is about 6,000 tons. The first evident human intervention in the Danube delta was in the 19th century in order to improve navigation. But the first major impact was in the 1960s. The construction of dams and channels necessary for establishing agricultural polders, reed harvesting, fishing and silviculture significantly altered the watercourses between the main branches. This changed the flow rate, sedimentation and other important natural processes in the Danube delta branches. In the early 1990s, these works were stopped. Another major threat to Danube delta biodiversity is pollution, not just from Romanian sources and tributaries, but from the upstream countries as well.

This was why the Danube Delta National Research Institute started to carry out ecological restoration works. The first project was in the Babina and Cernovca polders. Agricultural land was turned into wetland again and the results are impressive. The total expense for the works was around US$ 100,000 and the annual benefit from newly established wetlands, sustainably exploited, exceeded the costs two to threefold. The ecological value of these works (filter for sediments, biogeochemical changes) is certainly even higher.

Almost 9% (50,600 ha) of the Reserve's area was proclaimed strictly protected (18 particular areas) (see Box 9.1). Buffer zones cover 222,300 ha and economic zones occupy 306,100 ha, where natural resources such as reed harvesting and fishing are used sustainably.

9.2 Anthropogenic pressure on nature and bioresources

Forest exploitation

The total standing wood volume in Romania is estimated at 1,341 million m^3 with an average of 215 m^3 per hectare. Annual production is 5.4 m^3/ha, or more than 30 million m^3 in total. About half of this amount may be cut (according to forest management plans for the year 2000, this amount was 15.8 million m^3, of which 1.9 million m^3 in inaccessible areas) (Figure 9.2). Usually the cutting ratio over the past years has been below the approved ratio (about 11 million m^3). The cutting of forests in protected areas is strictly forbidden.

The usual method for wood exploitation is selective cutting (repeated interventions). Clear-cutting is permitted only in some forest types (spruce, locust, poplar and willow stands) or in riverside coppices as well as in the case of the restoration of some stands where the application of other treatments is not possible. Clear-cutting is only authorized for limited areas (3-5 hectares).

Industrial production (primary processing of wood) is declining due to the decrease in some traditional markets and to the obsolete technology that is still used. The 1995 Strategy for Forestry covers silviculture only and not the wood industry. This is regarded as too narrow an approach at present. Therefore, the forestry strategy that is under preparation is taking wood processing into account as well. Exports of wood and wood products were estimated at US$ 859 million in 1997, i.e. 10% of Romania's total exports.

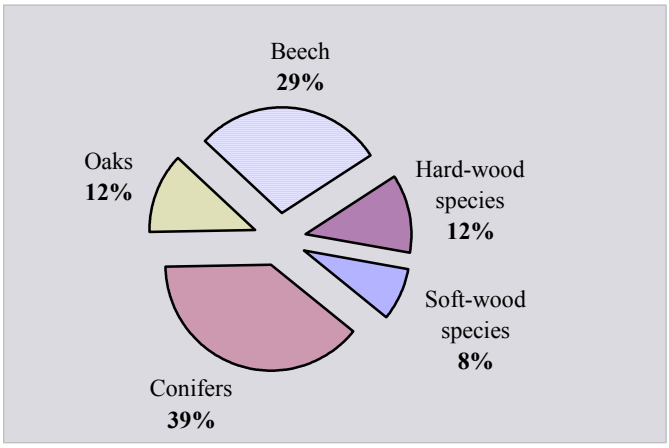
Forest products other than wood are also an important exploited resource. Basketry, forest fruits, mushrooms, medicinal plants, forestry seeds and saplings, Christmas trees, honey, game meat and trout, provide approximately 30% of the income of the National Authority for State Forest Management (RNP).

At present, most of the forestland (94%) belongs to the State and only 6% is privately owned. According to Law No. 1/2000 (addition to the Land Law of 1991) 2-2.5 million ha should be returned to the original owners. Forest privatization is very slow compared to agricultural land privatization. However, it is creating many problems in the implementation of forestry objectives, especially for protected areas and nature protection in the forests and afforestation plans.

Hunting

There are 239 game species in Romania according to annexes 1 and 2 to the Forestry Law (No. 103/1996). Annex 1 refers to game species that can be hunted and includes 84 species (25 mammals and 59 birds). The other 155 species are included in annex 2 and cannot be hunted (8 mammals and 147 birds).

Figure 9.2: Structure of cut wood by species



Source: Strategy Forestry, 1996.

The most important hunted annex 1 species are: deer (annual quota of about 5,000 specimens), Carpathian stag (1,700), fallow deer (400), black goat (300), wild boar (11,000) rabbit (120,000), pheasant (50,000) and partridge (15,000). Few of the quotas are taken up. The most critical situation concerning game species conservation is for the great bustard (*Otis tarda*), the lack grouse (*Lyrurus tetrix*), the little bustard (*Otis tetrax*) and the mouflon (*Ovis musimon*).

Hunting is organized and coordinated by the Ministry of Agriculture, Food and Forests through regulations governing hunting activities, which are monitored by the administrators of hunting funds according to Law No. 103/1996, modified by Urgent Government Ordinance No. 69/2000. There are about 200 hunting associations in Romania, 57 of them affiliated to the General Association of Hunters and Fishers of Romania. The others have been established during the past three years. The management of one or more particular hunting areas has been outsourced by concession or contract to about 150 of these hunting associations. Yearly hunting quotas proposed by the Ministry of Agriculture, Food and Forests have to be approved by the MWEP. There is no evident decrease or population decline of most of the important game species. However, changes in hunting fund ownership (shifting from State ownership and centralized management to hunting associations' temporary ownership and management) may well produce some adverse effects.

Annex 2 species are strictly protected according to the Bern Convention. The most important species on this list are brown bear, wolf, lynx, wild cat, otter, bison and bird species of the genera Aquila, Accipiter, Ciconia, Anser and Cygnus. Since the Convention allows exceptions, the member countries can approve the shooting of some specimens in certain cases (protection of wild fauna, prevention of farm damage, human safety and public health). The MWEP approves the annual hunting quotas for brown bear (about 500 specimen), wolf (1,100), lynx (250) and wild cat (1,300 individuals per year).

When foreign hunters are involved, it is the MWEP that issues permits in accordance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), for the trade and transport of trophies from the annex 2 list.

Anthropogenic pressures on fish populations

The fishing industry has declined, but it is still very important economically for the people living in the lower Danube area. Often fishing is a complement to other income. The drop in fish catches is due to the pollution from upstream as well as overfishing, illegal fishing and the destruction of spawning sites along the lower Danube.

Pollution pressure on the fish stock from domestic sources as well as from the upstream countries is very high. The most threatening are eutrophication and heavy metals. Beside that, the self-purification abilities of the Danube have decreased due to human intervention (dams and canalization causing disturbances in river vegetation and biodiversity) in the lower Danube flow and in the delta. Five sturgeon species are living in the lower Danube and they all have economic value. They are the most threatened among the fish populations.

In the Danube Delta area, ecological restoration works have started and have proved to be effective (decrease in phosphates and nitrates as well as other polluting substances). These works managed by the Danube Delta National Research Institute have also improved the spawning sites. The Danube Delta Authority is efficiently controlling fishing activities. Moreover, the ongoing programme for the Danube Green Corridor (protection and restoration) is likely to ensure an improvement in the situation of fish populations in that part of the river.

Exploitation of wild flora and fauna

Wild plants and animals have a particular economic and social importance in Romania. The collection of wild medicinal plants, wild fruits, game and other animals for individual consumption, trade or export is an important main or additional economic activity for many people (See Table 9.4). In recent years the pressure on these resources has increased significantly due to overexploitation. Action to regulate the unsustainable use of these resources was started in 1997. CITES provisions to control the international trade in endangered fauna and flora species were applied. In 1997 special taxes were introduced by Ministerial Order No. 201/1997 to charge for the use of biological resources. However, the practical enforcement of this Order started only in 2000.

Table 9.4: Export of natural biological resources, 1999

Resource	Unit	Amount
Mushrooms	*Tons*	4,894
Medicinal hub	*Tons*	2,353
Seeds	*Tons*	404
Tree wild fruits	*Tons*	9,780
Snail shells	*Tons*	547
Snail meat	*Tons*	830
Tubifex worms	*Tons*	55
Hare – live	*Number*	3,533
Pheasant – live	*Number*	111,000
Wild boar	*Tons*	55
Stag	*Tons*	40
Rockbuvk	*Tons*	5
Crawfish	*Tons*	2

Source: State of the Environment Report 1999.

Agriculture

The pressure of agriculture on the environment is substantial, although it has slackened during the past ten years, due to the decrease in animal farming, irrigation and fertilization (See Chapter 11).

The most important threat is soil erosion (water erosion affects about 6.3 million ha of agricultural land and wind erosion about 0.4 million ha). Despite the preventive measures, soil erosion has a tendency to expand and intensify. Landslides and soil hardening are severe problems as well. In addition, chemical pollution, oil pollution and pollution by waste landfills are affecting large land areas (see Chapter 8).

Moreover, almost half of Romania's agricultural land is affected by excessive drought (7.1 million ha). Romania is making a great effort to combat soil erosion and aridization. Romania has ratified the Convention to Combat Desertification and has drawn up its Strategy to Combat Desertification and Drought in Romania in the medium term (2000-2020).

Large-scale irrigation works were constructed during the past decades to improve agricultural productivity. Large areas in drought zones were equipped for irrigation (3.2 million ha potential irrigated areas). However, at present only 15-20% can be used due to the incompatibility of large irrigation systems with land fragmentation into small plots. Parallel to this, important forestry works were undertaken, such as anti-erosion and anti-drought land management. On the other hand, irrigation works have substantial negative effects on biodiversity. In addition to the direct damage caused by modifications of the works themselves, soil salinization occurs in the warmer areas inducing changes toward halophytic plant communities. The presence of irrigation water also modifies original plant communities, and natural steppe areas are turned into agricultural land with planted vegetation.

According to all environmental protection and agricultural strategies, the Romanian Government is determined to protect and preserve biodiversity in agricultural areas and natural biodiversity and to regulate genetically modified organisms (GMOs). Law No. 49/2000 regulates the use of GMOs and the prescribed methods for risk assessment (annex 12) are in line with the Cartagena Protocol on Biosafety to the Convention on Biological Diversity. In March 2000, a Biosafety Committee was established with members from different sectors of activity. The present government policy and programme focus on developing viable and efficient farms (i.e. favouring an increase in farm size through farmers' associations), supporting agricultural producers that are in less favourable conditions, preventing soil depletion, improving rural infrastructure, ecological rehabilitation and restoring soils and establishing a more sustainable and ecological agricultural production.

The most concrete strategic actions regarding protection against soil degradation are the creation of green belts (shelter belts) and the afforestation of degraded land areas. Concrete objectives have been set in ecological reconstruction programmes as shown in Figure 9.3. Other projects for setting up special agronomic zones for protecting autochthonous domesticated species of animals are being developed by the MWEP and the Ministry of Agriculture, Food and Forests.

Industry

In general, pollution pressure from industry has eased since 1989 due to the sharp decrease in industrial production. The industrial sector's share in GDP dropped from 57% in 1989 to 40% in 1999 (see Figure I.3). All polluting factors in the atmosphere (without exception) that are monitored have shown a substantial decrease since 1989.

Running water quality and stagnant water quality show the same tendency, i.e. the length of quality category I watercourses increased from 35% in 1989 to 59% in 1999 (see Figure 7.3).

Nevertheless, the pollution of atmosphere, soils and especially waters is still very high and is considered one of the most important threats to biodiversity. The recent Baia Mare mining accident had a serious impact on the living organisms in the Tisa River (see Box 7.1).

Tourism and other sectors

Tourism does not integrate biodiversity protection principles as a key concept. In general, biodiversity is not mentioned in priority fields for action. There are a few positive initiatives, but they are still unorganized. An example is the non-governmental organization ANTREC, which is the national association for rural, ecological and cultural tourism. It has established a wide network of rural tourist facilities throughout the country (see Box 11.2). The degradation of tourist sites by industrial waste and pollution is a major problem, in particular along the Black Sea coast. The lack of market surveys, as prerequisites for the development of tourist facilities, is a problem too.

9.3 Nature protection policy and management

Policies and strategies

Biodiversity

According to the 1996 National Strategy and Action Plan for Biological Diversity Conservation and the Sustainable Use of its Components (NBSAP), the priorities for the protection and conservation of biodiversity are:

- The conservation of ecosystems and habitats by the creation of a national system of protected areas;
- The conservation in situ and ex situ of threatened, endemic and rare species;
- The establishment of the necessary legislative framework and institutional capability for biological diversity conservation;
- The establishment of inter-department strategies that integrate the NBSAP objectives;
- The conservation and improvement of biological diversity by the reduction of negative impacts as well as the ecological restoration of altered ecosystems and habitats;
- The protection, conservation and restoration of the biological diversity specific to agro-systems through the implementation of appropriate technologies that favour sustainable agriculture;
- The educating and training of specialists and the general population in biological diversity principles;
- The involvement of NGOs and local communities in programmes for biological diversity conservation; and
- Special research and development programmes for biological diversity conservation.

Recently the Strategy has been revised and some amendments have been made.

An intersectoral approach to biodiversity protection is one of the main policy objectives. A major step was taken recently by integrating biodiversity protection and spatial planning in the legislation. A proposed protected areas network was incorporated in Section 3 of Law No. 5/2000 on the Spatial Plan of Territorial Management (PATN). This is connected to other objectives, namely the creation of a network of protected areas that will cover all ecosystem types and important habitats, and to other requirements for efficient protection (see Chapter 2).

During the period from 1996 to 1999 (from NBSAP to NEAP) there were new developments and some of the objectives were implemented. Now, according to the MWEP, the most recent objectives are broader and have different definitions that better match the obligations of the Convention on Biological Diversity.

According to the 1995 Forest Strategy updated in 2000, the sustainable management and use of forest resources is the most important objective, regardless of whether the forest is for economic use or not or whether it is State-owned or private. Therefore, wood is cut according to medium-term management plans (ten-year period) drawn up by the Forest Research and Management Institute and approved by Romsilva. Developing the scientific research and education for the sustainable management of the forests is also an important goal.

Forests

The new strategy (2000) has the long-term objective of enlarging the forest area to 40% of the country's territory. This target has been set on the basis of scientific research and is considered the best for this geographical region. This goes together with the creation of shelter belts in agricultural area. In southern Romania the forest cover should increase from 6-7% to 10% (See Figure 9.3). The most frequently used tree species for afforestation are spruce (36%); beech (12%); oak (14%); ash, sycamore, cherry, nut-tree (10%); poplar, willow (8%); acacia (13%) and other species (7%).

Legal framework

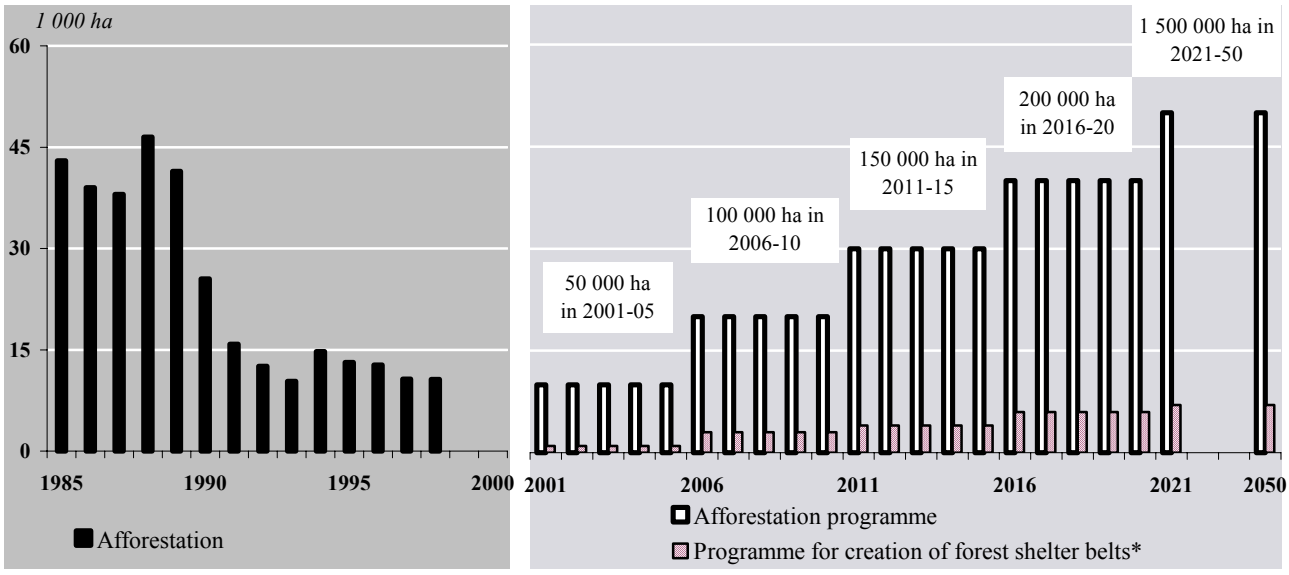
The basis of Romania's legislation lies in the Constitution. It stipulates the State's obligation to ensure the exploitation of natural resources in accordance with national interests, the obligation to conserve and rehabilitate the environment, as well as to maintain the ecological balance. According to article 11 of the Constitution, all international treaties ratified by Parliament become part of domestic legislation.

The Law on Environmental Protection (No. 137/1995) calls for a specific law on protected areas. An Urgent Ordinance for the protection of natural areas (No. 236/2000) has recently been passed. It is now being discussed in Parliament so that it can become an ordinary law. Other specific laws, government ordinances, government decisions and other regulations governing nature protection and the use of natural resources have been developed. All relevant legislation is listed in Box 9.2. Other laws on water, agriculture and air indirectly affect nature protection and biodiversity.

Regarding nature protection the Law on Environmental Protection also specifies that:

- environmental impact assessment should be compulsory in the initial phase of projects, programmes or activities, including those which modify the status of nature in a particular place, the trade in wild flora and fauna species, etc., in order to keep in view the technical solutions for maintaining the natural habitats, for the conservation of the ecosystems' functions;
- environmental planning should be correlated with territorial planning and urbanism.

Figure 9.3: Afforestation in 1985-1998 and afforestation programme for 2001-2050



Source: National Report on the Implementation of the UNCCD in Romania, MWFEP.

Note:
* 5 000 ha in 2001-2005; 15 000 ha in 2006-2010; 20 000 ha in 2011-2015; 30 000 ha in 2016-2020; 210 000 ha in 2021-2050.

Box 9.2. National Legislative Framework for the Management and Protection of Natural Resources

Law No. 5/2000 – on Spatial Plan for Territorial Management (PATN), section III on protected zones;
Law No. 82/1993 on setting up the Danube Delta Biosphere Reserve; amended by Urgent Ordinance No. 112/2000;
Law No. 12/1974 – on fish farming and fishing;
Law No. 5/1982 – on the protection of cultivated plants and forests, and the use of pesticides;
Law No. 18/1991 – Land Law – on the restitution of private forest and agricultural lands; supplemented by Law No. 169/1997 and Law No. 1/2000;
Law No. 26/1996 – Forestry Code;
Law No. 103/1996 – on the Hunting Fund and the Protection of Game;
Law No. 107/1999 – for the improvement of degraded lands through afforestation;
Decree No. 466/1979 on the regime of toxic products and substances;
Government Ordinance No. 21/1998 – regarding certain measures for the improvement of degraded lands by afforestation;
Government Ordinance No. 96/1998 – regarding the forestry regime settlement and the forestry fund management;
Other Government Decisions regulating the volumes authorised for cutting in forests;
Government Decisions regulating national and international nature conservation; and
All laws for the ratification of, or accession to, international conventions.

International treaties/conventions on nature protection

Convention for the Protection of the World Cultural and Natural Heritage (Paris), Law No. 178/1990;
Convention on Wetlands of International Importance Especially as Waterfowl Habitats (Ramsar), Law No. 5/1991;
Convention on the Conservation of European Wildlife and Natural Habitats (Bern), Law No. 13/1993;
Convention on Biological Diversity (Rio de Janeiro), No. Law 69/1994;
Convention on International Trade of Endangered Species of Wild Fauna and Flora (Washington), Law No. 69/1994
Convention on the Conservation of Migratory Species of Wild Animals (Bonn), Law No. 13/1998; and its 3 protocols on migrating birds (Law No. 89/2000), ASCOBANS (Law No. 90/2000) and Cetaceans (Law No. 91/2000).

Institutional arrangements

MWEP is the national body specialized in and responsible for establishing, promoting and implementing the policies and strategies for nature protection (including forests), biodiversity conservation, and the use of natural resources under its jurisdiction, i.e. at present water and nature assets. While forest management has been with the Ministry of Agriculture, Food and Forests since the end of 2000, the protection of forests remains the responsibility of the MWEP. Its Division for Biodiversity Conservation and Protection of Protected Areas and Nature Monuments (9 staff, Figure 1.2) is responsible for coordinating nature conservation activities and the management of protected areas, drawing up the policies and strategies, funding, proposing measures and normative acts, participating in the approval of ecological impact studies and assessments, and applying legal measures concerning the sustainable use of biodiversity components. Protected areas that are in forest zones are managed by the Ministry of Agriculture, Food and Forests, but their management plans should be submitted to MWEP for approval.

At field level, the local EPIs have direct responsibilities for nature protection, e.g. gathering information, proposing areas for protection, periodically monitoring, assessing, surveying the enforcement of the management plans, issuing authorizations, identifying affected areas. The management of the protected areas that have no specific managing authorities is not yet fixed as the Law on the protection of natural areas is still under discussion. The Danube Delta area is under the responsibility of the Danube Delta Biosphere Reserve Authority.

Three research institutes coordinated by MWEP are working on nature protection: the National Research Development Institute for Environmental Protection (ICIM), the National Institute of Marine Research in Constanta and the Danube Delta National Research Institute in Tulcea.

Monitoring

The monitoring of natural resources, forests, marshes and biodiversity is an integral part of the national Integrated Monitoring System. However, regular monitoring and surveys of ecosystems, species and genetic diversity is almost nonexistent. Unlike other topics in the monitoring system (air, water, soils), there is no institution designated to monitor nature and biodiversity. The local EPIs perform parts of the monitoring, however they are without sufficient staff and skills to perform this task properly. Thus, biodiversity monitoring is

irregular, carried out case by case, except for the Danube Delta Biosphere Reserve. Monitoring is also performed by the uncoordinated actions of non-governmental organizations.

Control and inspection are conducted by the Division for Monitoring and Ecological Control of MWEP. On the local level, inspections and controls are carried out by the control and inspection bodies within the local EPIs. Inspection of water, forest and hunting grounds, as well as the inspection and control of protected areas, however, are not part of the regular activities of the EPIs.

By contrast, the monitoring system of forests is very well established. It is an integral component of the International Cooperative Programme on Assessment and monitoring of Air Pollution Effect on Forests (ICP Forests). The main objective of forestry monitoring is to assess and better understand the stress factors (pollution, drought, modification of environmental conditions) on the health and production capacity of forests.

The monitoring network in the forests has two levels:

- The national network with about 10,000 sites with a grid of 2 km x 2 km (and 2 km x 4 km in the mountains). The state of tree crowns is assessed every year. The national network is coordinated by the Institute of Research and Forest Planning and the national Forest Direction;
- The European network with 247 permanent plots on a 16 km x 16 km grid. Observations are made every year on the tree crowns and every five years on the state of soil and growth.

Moreover, 15 representative forest ecosystem areas are intensively monitored.

Financing and economic instruments

Nature conservation activities have been mostly based on external international funding so far (see Chapter 3 and 5). A serious and constant shortage of finance is the main limiting factor in achieving biodiversity objectives. Two new opportunities seem to be available: the newly established Environment Fund and the funds linked to the Medium-Term Environmental Protection Strategy. According to this Strategy 4% of the total strategy budget is to be allotted to nature and biodiversity conservation.

Ministerial Order No. 201/1997 established the first taxes on the use of biodiversity components. This Order regulates the authorization procedure for harvesting, trapping and holding wild flora and fauna within the national territory, with a view to further commercializing them on domestic or foreign markets.

There are no taxes on tourists or tourist activities in protected areas. Only few activities (such as taking pictures) in the Danube Delta Biosphere Reserve are charged.

Research and information

Romania has a long tradition of research into nature and much scientific personnel. The diversity of Romania's flora and fauna has been sufficiently investigated. However, the lack of a national information network and information databases is a major problem affecting the implementation of biodiversity conservation objectives. Measurements/monitoring are adequate, but irregular and uncoordinated; the related data are not processed efficiently and therefore cannot be used as a decision-making and management instrument, for instance for defining the objectives of biodiversity conservation.

Some of the institutes dealing with biodiversity issues (such as the Danube Delta Research Institute) are coordinated by MWEP (see institutional arrangement). Much scientific work in the field of biodiversity is currently being performed in the universities and other institutes and institutions like natural history museums, botanical gardens, etc. Therefore, putting even more effort and money into its strengthening and further development is not seen as a priority and research and training are given low national priority in the terms of implementing the Convention on Biological Diversity.

Romania has not developed a Clearing House Mechanism, although this is important for the implementation of the Convention on Biological Diversity.

The red data book for endangered, threatened, rare and extinct species does not yet exist. However, the red book for vertebrates has been approved by the Academy of Sciences and will be published in early 2001.

9.4 Conclusions and recommendations

Romania has a rich biodiversity that is worth protecting. Its potential lies in large undisturbed areas containing well preserved ecosystems and rich natural resources. There are a number of success stories for nature protection in Romania, the famous Danube Delta Biosphere Reserve being just one of them. Romania is also an active participant in all international initiatives. The MWEP staff working in nature protection structures are making a great effort, very often beyond their regular obligations to try to fulfil this immense task.

However, there are many threats to this extraordinary natural heritage. They result from activities developed in the past, especially improper land use, colossal irrigation works and the development of heavy industry. In the past decade industrial and agricultural pressures on nature have been reduced due to the reforms in the economy, but other threats have become stronger (e.g. the unsustainable use of biological resources). Biodiversity is not considered a high priority in the present transition period. Other economic and social priorities are considered more important. This may produce additional negative impacts on the current state of biodiversity in Romania.

The change in landownership has a negative effect on biodiversity conservation (for instance, restrictions on land-use activities are not applied in protected zones). There are no exact data on the proportion of land that should be or has been returned to the original owners. To date, approximately one fourth of the 'restituable' lands has been privatized. Strictly protected zones will remain State property. For other protected areas, the owner should respect the management plan for the area that includes restrictions on their use. All restrictions are specified in the property contract that the owner signs at the time of restitution. In case of non-compliance, the owner can be expropriated, a sanction that has never been implemented so far. Economic activities in the buffer zones of particular protected areas should be better regulated with the forthcoming law on the protection of natural areas.

To date, there are no management plans for most of the protected areas. A first step has been taken: local EPIs have inventoried the protected areas in their counties on the basis of specially designed standard forms. The consolidated national list is included in the recently adopted Urgent Ordinance. The next step will be the forthcoming law on the protection of natural areas. The proposed law will impose management plans on all protected areas according to protection regimes that will comply with the internationally accepted IUCN definition. In the absence of a legal framework no further progress can be made.

At present protection is concretely implemented only in those protected areas that have gained international support through particular projects. These are mostly internationally important areas. But no national strategy and no priority list exist. The other protected areas are neglected. Needless to say that it is too early to speak of nature protection outside protected areas, except maybe for those forests that have a protective role.

According to the National Assessment of the Implementation of the Convention on Biological Diversity (drawn up by the World Conservation Monitoring Centre and issued in mid-2000), the most important limiting factors for the implementation of the Convention are:

- An insufficient institutional capacity that needs strengthening;
- Too low a priority for biodiversity protection (and environmental protection in general);
- A weakness in law enforcement due to the under-capacity of the administrative authorities;
- Weak implementation of environmental actions although many strategies and action plans have been drawn up; again the lack of adequate human resources and financing is a real problem;
- The weaknesses of the action plan and the implementation structures of the National Biodiversity Strategy and Action Plan developed in 1996 (currently being revised).

Following the requirements of the EU integration process, sectoral working groups were established on the basis of a Ministerial Order. Thus, a working group for nature protection and genetically modified organisms management was established. Also, environmental protection departments have been established in some ministries (e.g. industry, food and agriculture, physical planning, transport). However, the very composite and complex issue of biodiversity conservation and the sustainable use of its resources have not been given adequate treatment and priority. The intersectoral departments should be reinforced with biodiversity

experts and staff should be trained in nature protection. The lack of coordination among interested parties may delay the accomplishment of the objectives for nature protection or even lead to its irreversible degradation and destruction and the loss of habitats and species.

The departments for nature conservation in the local EPIs have been given many responsibilities. Monitoring, controlling and inspecting the protected areas will be among their tasks as well as inventorying species and ecosystems, drawing up management plans, preparing proposals for new protected areas, etc. In general, EPIs are understaffed to perform all these duties. They usually have only one post per agency. At ministry level, the staff dealing with nature and biodiversity conservation is very small.

Recommendation 9.1:
The Ministry of Waters and Environmental Protection should strengthen the implementing capacities, in terms of both skills and number of staff, in biodiversity protection at every level – national, regional and local – and seek a leading role in inter-ministerial cooperation. The departments for nature conservation in the local Environmental Protection Inspectorates should be strengthened in order to fulfil the new obligations regarding monitoring and compliance under the future law on the protection of natural areas.

Monitoring of the different levels of biodiversity is the most complex task in integrated monitoring. It needs the involvement of numerous experts. When analysing the different strategies, action plans and reports concerning monitoring, it seems that biodiversity monitoring is too briefly mentioned in the scope of integral monitoring programmes. So far there is no complex, coordinated and integrated biodiversity monitoring system in Romania. Current monitoring activities are irregular and only performed ad hoc. They are more like the normal inspection activities of the local EPIs. An encouraging feature is the growing involvement of NGOs and local communities. For example, the Romanian Ornithological Society is drawing up an inventory of migratory bird species in about 60 protected areas and monitoring them.

Recommendation 9.2:
Based on the lessons learnt from the recent GEF projects, the Ministry of Waters and Environmental Protection should establish as soon as possible a national monitoring system for biodiversity as a high priority.

Together with strengthening implementing capacity in biodiversity protection, resources should be identified and mobilized. The compliance with a large number of conventions and the implementation of numerous strategies and action plans require an increasing amount of national capacity and resources.

Recommendation 9.3:
The Ministry of Waters and Environmental Protection should develop a national information exchange network – like the Clearing House Mechanism in the Convention on Biological Diversity – to facilitate access to information, exchange of research information and data.

There are ambitious short, medium and long-term objectives in both the forestry and the agricultural strategy. The final goal is to enlarge the forest area to 40% of the country's total territory. About 2 million ha of degraded land (eroded land, mainly on the slopes) have been set aside for afforestation. The implementation will be achieved through an inter-ministerial approach. The land has been inventoried, the conditions for land use and short and medium-term plans for afforestation established, but overall implementation is hampered by the lack of financial means and by the fact that private landowners are hard to convince of the importance of the matter. However, in the Environmental Protection Strategy for the medium term, 6% of the total cost of the environmental protection and improvement should be devoted to afforestation. All sources (State budget, external and other sources) should be mobilized to reach this 6%.

Then, a further effort should be made for the repositioning of available human resources. As suggested in Recommendation 9.1, employees in the Ministry or at local level (local offices of Romsilva, the National Authority for Forest Exploitation) should pay more attention to practical implementation. Concrete strategies and plans to carry out afforestation should be drawn up. Financial means should be allotted for, among other things, subsidies and buying land.

Recommendation 9.4:
The Ministry of Agriculture, Food and Forests should draw up implementation plans, including financial resources, and cooperate with the Ministry of Waters and Environmental Protection in order to achieve the objectives for the afforestation of degraded land and the creation of shelter belts in agricultural areas.

The creation of the network of protected areas is among the priority objectives of the most recent strategies. It has been included in the national spatial plan too. It is time to start to work towards this objective since it is the most efficient way of nature protection and conservation. Preparing the CORINE biotope project is a good starting point. EMERALD and NATURA 2000 are targets to be reached since Romania is pursuing the accession process to EU. Steps towards the Danube Green Corridor may serve as an excellent example of both a national and an international network.

Recommendation 9.5:
The Ministry of Waters and Environmental Protection should start establishing the network of protected areas according to the IUCN categories on the whole territory of the country, incorporating all the different types of habitats. The protected areas should comprise at least 10% of the country, in accordance with the Convention on Biological Diversity, which Romania has ratified.

The Urgent Ordinance for the protection of natural areas (No. 236/2000) does not contain provisions for protecting habitats, ecosystems or species outside protected areas. There, important species are also in need of protection, in particular where agricultural activities are carried out.

Recommendation 9.6:
The Ministry of Waters and Environmental Protection should issue regulations to protect biodiversity in agro-ecosystems. The sustainable use of herbaceous species with medicinal, melliferous or fodder value must be ensured (for instance in Bucovina).

The involvement of NGOs and local communities in programmes for biological diversity conservation is one of the objectives of the 1996 National Strategy and Action Plan for Biological Diversity Conservation and the Sustainable Use of its Components (NBSAP). So far, the MWEP has done too little on this issue. There is an evident lack of coordination between the MWEP and NGOs.

The involvement of NGOs in nature conservation is only sporadic and accidental without any cooperation strategy. Almost all activities performed by the NGOs are on their own initiative and financed by international grants. There are very few public debates, especially in the impact assessment process, as well as in the drafting of environmental laws. A better involvement of the NGOs could greatly benefit all actions concerning nature protection and biodiversity conservation, and could usefully complement and sustain the inadequate resources that are spent on this issue.

Recommendation 9.7:
The Ministry of Waters and Environmental Protection should broaden and strengthen the cooperation with NGOs and local communities at all stages – from design to implementation - of biodiversity conservation programmes. The modalities for collaboration and coordination between MWEP and NGOs should be clearly defined (See also Recommendation 4.4).

Chapter 10

MINERAL RESOURCES

10.1 Mineral resources and mining: general overview

Mining and processing of metals

Although Romania has significant reserves of copper, lead, zinc, gold, silver, bauxite, manganese and iron ore, the country produces only relatively small amounts of non-ferrous metals and small quantities of iron ore (Table 10.1). Copper is mined mostly in two districts: the north-west, with mines at Baia Mare, Sprie, Cavnic and Lesul Ursuli, and the south-west, with major mines at Moldova Noua, Rosia Montana and Rosiia Poieni. The ore grade is generally low, with major producing mines (Moldova Noua and Rosia Poieni) containing ore grading only about 0.35% of Cu or less. Concentrates from these areas are smelted and refined at Baia Mare and Zlatna.

Lead and zinc are produced at underground mines in Baia Mare, Baia Borsa, Certej and Rodna districts. They are low-grade ores grading 0.4-1.0% of lead and 0.6-1.2% of zinc, with associated copper (0.35%), antimony, bismuth, cadmium, gold and silver. Due to the complex mineralogy of the lead and zinc ores, concentrates produced from them are uneven. Metal recovery in concentrate ranges between 50% and 75% for lead and zinc, respectively. Smelting and refining of lead and zinc from domestic and imported ores and concentrates are carried out at the Imperial Smelter at Copsa Mica and at the Romplumb SA Smelter at Baia Mare.

Romanian gold resources are mainly concentrated in Transylvania's Golden Quadrilateral, a major gold mining region comprising the cities of Baia de Aries, Brad, Sacarimb and Zlatna. Gold production in this region was reported to be about 140,000 ounces in 1996. The Rosia Montana opencast and the Brad underground gold mines belong to the joint venture between Gabriel Resources of Canada and the State-owned mining company MINVEST S.A. Deva. Feasibility studies on developing the Rosia Montana Mine and reprocessing tailings from both mines have been undertaken. Rosia Montana's output is reportedly from 10,000 to 12,000 ounces per year. The gold deposits of Cetate and Carnic were evaluated at 45 million tons of ore, graded 1.7 g/ton of silver and 2.46 million ounces of gold. Another potential area for gold exploration is the Bucium intrusive complex in the Metaliferi Mountains. Since 1999, gold has been processed from old tailings in the Baia Mare region by the Australian-Romanian joint venture company Aurul SA. The precious metal treatment plant of Aurul was designed for a throughput capacity of 2.5 million tons per year.

Bauxite opencast and underground mines are operated at Dobresti-Oradea. Alumina is produced by the Tulcea and Oradea refineries. In 1996, the Tulcea refinery was purchased (51% interest) by the Balli Group-UK and Bayraktar Holding of Turkey. The country's only primary aluminium smelter is at Slatina, in southeast Romania. Small quantities of iron ore are mined in Romania. Most

Table 10.1: Mining output of ferrous and non-ferrous metals, 1993-1998

Tons

	1993	1994	1995	1996	1997	1998
Iron ore *(1 000 tons)*	856	951	865	860	756	459
Lead in concentrates	16,929	23,838	23,194	21,356	19,447	15,128
Zinc in concentrates	28,017	35,357	36,737	32,082	31,737	25,650
Copper in concentrates	25,250	26,034	24,520	24,434	22,638	19,065
Raw bauxite *(1 000 tons)*	186	184	175	175	127	162

Source: Statistical Yearbook of Romania, 1999.

Box 10.1. Maramures mining region, northwestern Romania

Maramures County, where the town of Baia Mare is located, lies on Romania's northwestern border with Ukraine and Hungary. It has a long history of mining of minerals such as gold, copper, lead, zinc, silver, manganese and salt. The county has high levels of persistent contamination of soil, water and air with many pollutants. These were released during the decades of industrial activity that used environmentally unsound technologies, including an old lead smelter, copper smelter, sulphuric acid plant, the operations of the national mining company REMIN (Compania Nationala a Metalelor Pretioase si Neferoase), and Aurul S.A., a joint venture between REMIN and Esmeralda Exploration Ltd Australia. Seven major mining sites of REMIN S.A., all operating without environmental permits, and one of Aurul S.A., are spread throughout the county. Wastes from mining operations are stored in 243 deposits of mining waste rocks and 20 tailing dams (12 abandoned, 7 active and 1 damaged), with 3.5 and 113 million tons of accumulated wastes, respectively. The total area occupied by tailing dams in Maramures County is about 433.3 ha, of which 60 ha were recultivated. Environmental concerns were not taken into account in Baia Mare's urban development plan. The town's expansion is now restricted in some areas by old contaminated tailings. Furthermore, Baia Mare was identified as a health risk hot spot by the World Health Organization, with the population's exposure to lead being among the highest ever recorded.

feedstocks of ores and concentrates for the country's steel industry, however, have to be imported, mainly from the former Soviet Union. Major steel mills operate in Clarasi, Caras-Severin, Cluj, Galati, Hunedoara, Resita and Targoviste. The privatization process is playing an important role in the development and modernization of the steel industry, attracting foreign investments as well as bids for stock in the sector.

Industrial materials

Romania also has an extensive output of industrial minerals. Barite, bentonite, diatomite, feldspar, graphite, gypsum, kaolin and limestone among others, are mined at about 60 deposits throughout the country. The modernization of Romania's economy and infrastructure has increased the demand for many of these commodities. The privatization of mining companies producing industrial minerals is more advanced than that of other sectors of the mining industry. Major acquisitions include the purchases of the Romcim SA and Cimentul SA Turda cement plants by a French company and by a Swiss company, respectively.

Oil, natural gas and coal

Romania's experience with the oil and gas industry goes back more than 140 years. In 1998, proven oil and natural gas reserves were 1.6 billion barrels and 13.2 trillion cubic feet, respectively. With the opening of 15 oil and gas blocks for exploration in 1996, and the influx of western technology, Romanian reserves and production are expected to rise slightly in the coming years. The oil industry is managed by the "Regis Autonomus" for Petroleum (PETROM), the Romanian Refinery Company (RAFIROM), the Romanian Petroleum Transport Company (CONPET) and the Romanian Petroleum Distribution Company (PECO). In 1997, foreign operators working in Romanian oil and gas fields included Amoco, Shell and Enterprise Oil. PETROM was tentatively scheduled for partial privatization in 1999-2000. ROMGAZ, the national gas company, operates gas production, transport and distribution services and controls its underground storage, but does not hold an exclusive sales monopoly. The company is currently undergoing an extensive restructuring programme. Major oil refineries are located in Ploiesti, Pitesti, Midia and Onesti.

Romania is still a significant oil and gas producer in Europe despite a continuing decline caused by both the depletion of older deposits and a lack of the technology needed for increased recovery of petroleum. Over 23,000 wells up to 3,500 m in depth and 350 deeper wells for exploration and development have been drilled in Romania, identifying oil and gas fields underlying the entire country. In 1998, oil production totalled more than 6.3 million tons (Table 10.2) extracted from 13,500 wells (onshore and offshore) in more than 450 active oil fields. Among the major oil and gas fields are the Ticleni, Bilteni, Craiova, Leonardi Budisterni, Frasinu-Mislea and Gura-Ocnitei fields. About one third of the oil is produced by water injection and thermal methods, such as *in situ* combustion and steam injection. In 1998, natural gas production amounted to more than 14.4 billion m^3 from about 5,000 wells (onshore and offshore) in 300 active fields. There is a possibility of increasing Romanian oil and gas reserves, since over 50% of the country's territory lies on sedimentary rocks that can host hydrocarbon deposits.

Table 10.2: Oil, gas and coal production, 1993-1998

million tons

	1993	1994	1995	1996	1997	1998
Crude oil	6.7	6.7	6.7	6.6	6.5	6.3
Natural gas *(billion m^3)*	21.3	19.6	19.0	18.2	15.9	14.4
Coal	42.4	43.3	44.0	44.8	36.2	28.1

Source: Statistical Yearbook of Romania, 1999.

Major coal deposits are located in the Jiu valley, with recoverable coal reserves estimated at 3,980 million tons in 1996. Parallel to the overall economic slump, coal production experienced a sharp decline in recent years, falling from 66.4 million tons in 1989 to 28.1 million tons in 1998. Less than 10% of the coal produced in Romania is bituminous and the remainder is lignite coal.

Uranium

The prospecting for uranium in Romania was initiated in the 1950s. Since then, some 13 deposits and 9 occurrences were discovered in three major uranium provinces: Western Carpathians (Apuseni Mountains), Banat Mountains and Eastern Carpathians. The Apuseni and west Banat Mountains have a good uranium potential, since they include the deposits of Bihor and Avram Iancu, and Ciudanovita, Dobrei and Natra, respectively. Rocks in Eastern and Middle Carpathians, such as Crucea, Botusana and Tulghes, also host uranium deposits. Romanian deposits are of endogenous origin, mainly formed by pichblende and associated sulphide mineralization.

Uranium production started in 1952. From 1952 to 1961, all uranium production was taken by the former Soviet Union. Underground mining technology has been used in all of the deposits, with the exception of the Banat Mountains deposits, where opencast mining was used. The extracted ore used to be shipped abroad for processing, as there were no such facilities in Romania. The uranium concentrate was then shipped to the former Soviet Union. Many uranium deposits are now depleted, as, for example, the high-grade Baita Bihor (1.13-1.26% of U), Ciudanovita, Dobrei North and Nastra deposits. Uranium production was stopped in 1961 with the break up of a joint venture with a former Soviet company. In 1978, when the Feldiora hydrometallurgical plant became operational, the production of uranium concentrate resumed. Part of the production obtained was sent to FCN Pitesti nuclear fuel plant as uranium and sodium diuranate. In 1985, the circuit of the Feldiora plant was extended to include a refining section capable of producing uranium dioxide. The oxide is used in the production of fuel for the Candu-type reactors under construction at the Cernavoda nuclear power plant.

A total of 15,557 tons of uranium of known conventional resources is reported from ores with an average uranium content of 0.11% of U, and 4,970 tons of U of hidden resources. Three mining plants are in operation: E.M. Banat, E.M. Bihor and E.M. Crucea. In 1997, they produced 150,000 tons of ore, with an average mining recovery of 80%. According to estimates of the International Atomic Energy Agency (IAEA), Romania produces 100 tons of U annually. In Romania, all uranium-related activities are carried out by State-owned companies, under the coordination of the Uranium National Company S.A. (ICPMRR). Due to decreasing State budgets, expenditure on uranium exploration and development has been reduced in recent years, falling from US$ 2,448,000 in 1995 to US$ 926,000 in 1998. Currently, no uranium is imported or exported from Romania.

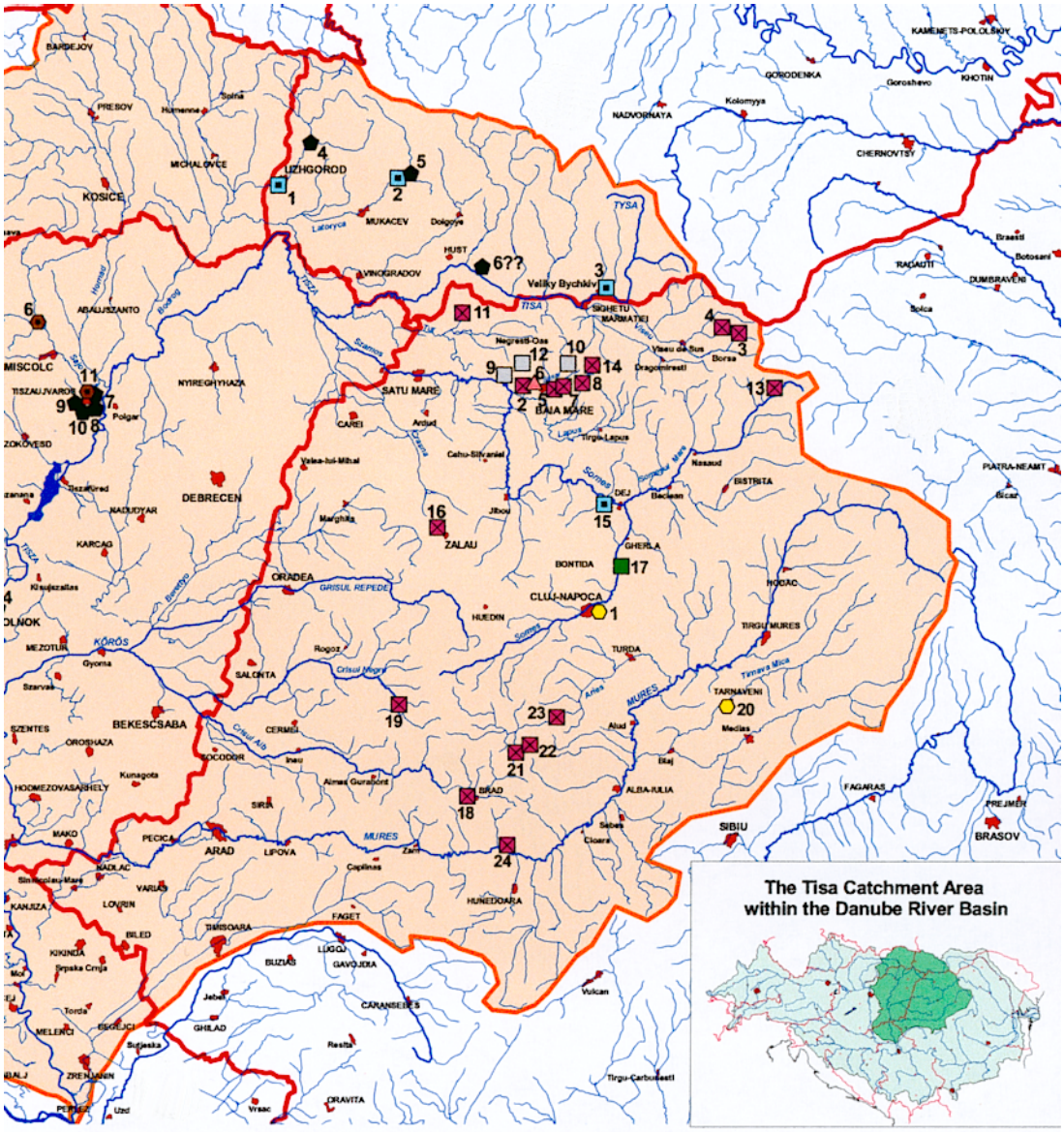
10.2 Environmental issues in the mineral sector

Romania has a long history of mining, in particular of non-ferrous metals, oil, gas, coal and uranium. Diffuse pollution from areas where mining has been going on for centuries has had a long-term impact on the environment and human health.

Tailing impact management

Romania's major deposits of non-ferrous metals have copper, lead and zinc mineralizations in the form of sulphides, together with pyrite and marcasite. Under aerobic conditions and in the presence of bacteria, sulphuric acid is formed by the oxidation of sulphides. This process results in the formation of acid mine drainage, which is a.

Figure 10.1. Inventory of potential risk spots (industrial hot spots and tailing ponds) in NW Romania



LEGEND

- Tailing ponds & deposits
- Mining industries
- Metallurgical industry
- Chemical industry
- Oil industry, pipeline
- Tisza basin
- Country border
- Settlements
- Energy production
- Food, sugar factory
- Cellulose & paper industry
- Pig farm
- Main Rivers
- Tributaries

0 25 50 75 100 125 km

Scale: 1: 2 500 000

1. SC Terapia SA Cluj-Napoca
2. SC Aurul SA Baia Mare
3. SM Borsa (Colbu)
4. SM Borsa (Novel)
5. SM Bala Mare UP Saser
8. SC Allied Deals Phoenix SA
7. SM Baia Mare- EM Baia Sprie
8. SM Bala Mare- EM Cavnic
9. EM Aurum-IIba
10. SM Baia Mare - EM Herja
11. CMNPN Rennin B. Mare- EM Tun
12. EM Aurum- Nistru
13. Remin SA Baia Mare-Rodna
14. SM Baia Mare - EM Balut
15. SC Somes SA Dej
16. SC Comnex Nemetalifere SA
17. SC Agrocomsuin-SA Bontida
18. SC Devamin SA Mine Brad (Rabita)
19. SC Devamin SA Mine Baita (Fanate)
20. SC Bicapa SA Tamaveni
21. E.M. Abrud
22. E.M. Rosia Montana
23. E.M. Baia de Aries
24. E.M. Coranda Cartel

Source: ICPDR International Commission for the Protection of the Danube River

major source of chronic environmental pollution in mining areas. Due to the low pH of these waters (1.5 to 3.0), heavy metals such as copper, zinc, cadmium, arsenic and lead can be leached from the rock and mobilized, causing severe contamination of water, soil and vegetation. Moreover, heavy metals can enter the food chain. As pyrite oxidation takes place only under aerobic conditions and the reaction is rather slow, acid mine drainage is mainly a long-term problem of abandoned mining sites (waste rock piles and tailing ponds). Currently, Romania has many abandoned tailing dams and mining waste rock piles, which are potential sources of heavy metal contamination by acid mine drainage. According to the Ministry of Industry and Mineral Resources, in 1999 the National Company MINVEST S.A. Deva had 14 active mining sites and 15 "in conservation", which means in most cases just abandoned. Similarly, the National Company REMIN S.A. in Baia Mare has 7 active mining sites and 14 "in conservation". In Romania, particularly in Maramures County, the problem of acid mine drainage is aggravated by the high amounts of pyrite and marcasite in the sulphide ore, which are not separated by milling and flotation processes, but deposited with the tailings. Assessments by international experts and national agencies have shown that the river system in the Maramures mining region has been highly contaminated with toxic heavy metals for many years. In addition, leakage from old pipelines and dam safety problems pose environmental and health risks. In 1999, two accidents due to leakage in the pipeline system of the Aurul S.A. company in Baia Mare were reported. Fortunately, the quality of the surface waters was not found to be affected by the leakage. A risk assessment made by Apele Romane for NW Romania, pointing out 11 risky tailings deposits, has recently been complemented by a new inventory conducted by the International Commission for the Protection of the Danube River. This inventory covers potential risk spots in the Tisza river catchment area (Romania, Hungary, Ukraine, Slovakia), identifying in NW Romania 17 tailing ponds and deposits, 3 mining industries and one metallurgical industrial facility (Figure 10.1).

Abandoned tailings are also potential sources of air pollution due to their high content of fine particles, which can be spread by the wind. Unprotected tailing ponds contribute to the reported high concentrations of dust and heavy metals in the ambient air of some important mining regions in Romania. Soil erosion is another problem related to wind and rain water which can affect the mechanical stability of dams. These are common problems that can be minimized or stopped by "recultivating" old mining tailings, as one of the environmental management tasks of mining companies. However, recultivation is not yet common practice in Romania; it is done only sporadically and on too small a scale.

Mining waste waters

Due to economic constraints, investments into environmental facilities by Romanian mining companies have been reduced to a minimum. As a result, many mining waste-water treatment plants are currently in a bad state, operating manually with obsolete and ineffective technologies. The Herja mine water treatment plant in Maramures County, which belongs to REMIN S.A., illustrates this situation. It has a simple system, with three decantation pools with very old decanters and pumps, working with a minimum of efficiency. The

Box 10.2. The Aurul S.A. company, Baia Mare

The Aurul company for gold and silver extraction was established in 1992 and started operating in May 1999 by re-processing the ore of 30-year-old tailings (Meda Dam), located near the city of Baia Mare and close to a residential area. It created 150 new jobs (200 additional jobs during the construction phase) and provided investment into the Baia Mare mining area, where unemployment was high. The company obtained an environmental permit from the Ministry of Waters and Environmental Protection in 1993. The operating permit was issued in 1999, based on documentation contained in the environmental impact assessment (EIA). The Meda tailing dam has a reserve of about 4.43 million tons of material, with 0.6 g of gold recovered per ton. The technology used is carbon-in-pulp, which mobilizes high concentrations of free cyanide in the process waters for the extraction of gold and silver. The whole process is designed to operate in a closed circuit with the cyanide containing waters being reused, after solid sedimentation in the Aurul pond. The whole project lifespan is 10-12 years, with a production of approximately 1.6 tons of gold and 9.0 tons of silver per year. However, this may increase with additional reserves following recent business deals concluded with Romanian companies. Next to the Aurul plant tailing dam, there is the National Mining Company REMIN, which operates a process similar to that used by Aurul. According to the local EPI authorities, REMIN's dams were not built in the proper conditions and do not have adequate provision for emergency discharge and/or the storage of excess water.

mechanical filters (in wood) are outdated, needing urgent replacement by modern and effective ones. Under the present conditions, huge volumes of waste water containing heavy metals are continuously discharged into the environment without adequate treatment, with severe consequences for the local ecosystems.

Environmental impact of oil, gas and coal exploitation

The oil and gas sector has to face many environmental challenges in order to improve its overall performance. Due to the technology used in oil exploitation, more than 80% of the field water is reinjected into wells. Thus, environmental impacts are primarily related to the amount of field water handled and to oil-contaminated waters. Drilling muds, bottom tank sludge, volatile organic compounds (VOCs) and flue gases also negatively impact the environment. Approximately 50,000 ha of land is contaminated by hydrocarbons and groundwater is contaminated in many areas such as Ploiesti and Campina. In these areas, contamination of underground water has seriously impacted drinking water sources and has exposed local residents to considerable risk. Ineffective procedures and equipment in managing and disposing of waste drilling muds and sludge are an additional environmental concern. Soil contamination in many well sites from Petrom, Romgaz and Conpet requires immediate clean up. Spills and leaks from old pipelines also contribute to environmental pollution. The environmental impacts of gas extraction and transport are related to the field water that is produced (not well separated before the gas enters the transport system), compressor oil that escapes from compressed gas which condenses in the pipeline, and flue gases that are emitted from compressor engines. Regarding the refining process, there is a general lack of efficient monitoring equipment and guidelines for gaseous emissions and flue gases in operating refineries. Large amounts of waste water and inefficient treatment facilities result in discharges of polluted water into the environment.

Most of Romania's coal mines are developed underground. Underground mining operations produce far less waste per ton of ore than opencast operations because there is no overburden and some of the removed material can be used to backfill excavations as work progresses. Thus, environmental problems related to waste rock piles are not significant, although emissions of noxious gases from mining sites may create a health hazard for local residents. The main environmental issue in coal mining is the inefficient treatment of the huge volume of waste waters due to outdated technology and equipment in the water treatment plants.

Radioactive wastes from uranium mining and milling

The environmental impacts of uranium exploration, exploitation and milling activities include radioactive liquid effluents, waste rocks from mining and tailings from ore processing. Another environmental hazard is the storage at mining sites of low-grade ore with a uranium content of 0.02-0.05%, which is not currently processed. In

Box.10.3. The Baia Mare and Baia Borsa accidental spills

On 30 January 2000, there was a break in a tailing dam operated by Aurul S.A. company in Baia Mare (see Box 7.1). On 10 March 2000, as a consequence of an overflow and breach of the Novat tailing dam operated by the State-owned mining company REMIN S.A. in Baia Borsa, 100,000 m^3 of water with about 20,000 tons of solid tailings sludge was released into the river system. Although the amount of cyanide in these tailings was very small and not at all comparable with the cyanide concentrations at the Aurul dam, the heavy metal concentration was relatively high. The Baia Mare Task Force has identified the inappropriate design of the tailing pond, the acceptance of such a design by the permitting authorities and inadequate monitoring and dam construction, operation and maintenance as causes for both accidents. These factors were triggered by severe weather conditions, which could and should have been foreseen.

Various organizations, such as the United Nations Environment Programme (UNEP) and the Office for the Coordination of Humanitarian Affairs (OCHA), the United States Environmental Protection Agency (USEPA), the World Wide Fund for Nature (WWF) and the United Nations Development Programme (UNDP), have assessed the impact of the spills in northern Romania and a further environmental assessment has been prepared by the Baia Mare Task Force. According to the UNEP/OCHA report, acute effects, like the immediate killing of plankton and fish, were observed where the cyanide plume passed along the river system. The spill also drastically increased the existing heavy metal contamination (especially copper, lead and zinc) of sediments near the broken dam. However, heavy metal contamination decreased rapidly further downstream. Today, the ecosystem of the river Somes-Tisza basin seems to be naturally regenerated as wildlife is recovering along the river. The recommendations of the Task Force included the need for long-term monitoring of the ecological effects, an inventory and risk assessment of all mining and related industries in the Maramures region and a broad, long-term strategy for the Maramures region and the Tisza river.

addition, during the exploitation and processing of radioactive minerals, the risk of contaminating metal waste and the mechanical filters (wood and textile) with radioactivity is high.

In Romania, a surface of about 1,000 ha is contaminated with natural radioactive elements. There are over 150 deposits containing 6 million m^3 of waste rocks from uranium mining operations and two tailing ponds containing 6 million tons of wastes from uranium-ore processing. They are potential sources of airborne radiation resulting from the decay of radon gas released from the ore and dust, and are a health hazard for local residents. These radioactive waste materials are sometimes used in construction. Also, there is a serious problem of seepage of uranium tailings, which increases the risk of the contamination of soils and groundwaters by radionuclides (generally Ra-226). However, many mining dumps and tailings do not have an environmental management system in place. Abandoned and active uranium dumps and tailings are a huge environmental issue in Romania, requiring adequate reclamation and revegetation. Moreover, the capacity of some tailing impoundments is not high enough, and should be increased. At present, various mines have storage places that should be properly closed to prevent environmental contamination.

Mining and milling effluents containing natural radioactive elements above the maximum admissible concentration are an environmental and health concern. The daily release of radioactive liquid effluents into the environment is about 14,000 m^3, of which 10,000 m^3 are mine waters with an average content of 2-3 mg U/l, and 4,000 m^3 are effluent from uranium processing with an average content of 4-7 mg U/l. Part of the liquid effluent is treated in order to retain uranium, so that at release the average contents are of 0.2 mg U/l for mine waters and 0.4 mg U/l for processing waters, which are compatible with international limits. Nevertheless, a huge (but not precisely quantified) amount of radioactive effluent is still discharged into the environment without adequate treatment. There is a general need to build or enlarge water treatment plants for uranium mining and milling in mining sites located in the Apuseni and Banat Mountains and Eastern Carpathians.

10.3 Policy objectives and instruments for the management of mineral resources

Government policies and programmes

In 1998, Romania's Government became seriously involved in the reform and rationalization of the country's mining sector. A new Mining Law (No. 61/1998) was passed, establishing modern rules for the management of mineral resources. The Government also decided to close unprofitable operations, including petroleum refineries and State-owned enterprises such as coal mining companies, and planned to cut subsidies to the mining sector. Small and medium-sized State-owned enterprises, before the privatization, should be restructured as commercial companies. The so-called "Regies Autonomes" are enterprises that continue to be owned and operated by the State, but which are able to lease or sell some assets to increase profitability. Mining and mineral industries belong to this category.

Romania has identified the principal areas in need of urgent action in the industrial sector, which includes the mining and metallurgical industries:

- renewal of existing production units to respond to energy, mineral raw material and environmental constraints;
- adoption of non-polluting production processes and technologies at the national level;
- support of existing industries through the introduction of emission-reducing equipment and technologies;
- establishment of a national integrated monitoring system for environmental quality;
- environmental training at all levels.

The oil and gas sector has also developed environmental policies. In order to accelerate the implementation of the main sectoral policies and strategies, the Government of Romania and the World Bank established the Petroleum Sector Reform Programme. The Canadian International Development Agency (CIDA) and Industry Canada have provided funds to implement the environmental aspects of this programme. Representatives of the Ministry of Industry and Mineral Resources, the Ministry of Waters and Environmental Protection and the National Agency for Mineral Resources are directly involved in this programme. Six initiatives were identified:

Box 10.4. Environmental radioactivity in uranium mining areas

A recent study conducted by the National Commission for Nuclear Activities Control concluded that uranium mining is increasing the natural radioactivity of the environment in Romania. Two uranium mining areas were investigated: the Western Carpathian areas of Alba, Bihor and Arad (with tailing sites in Lupsa, Garda, Arieseni, Baita, Lazuri, Ranusa, Barzava and Milova) and the Moldavian area of Crucea, Tulghes and Grinties (with tailing sites in Crucea, Tulghes, Grinties, Bicazu Ardelean). Quarterly sampling campaigns were conducted at these sites. Samples of surface water, groundwater, river sediment, vegetation, undisturbed soil and tailings were collected.

In the Western Carpathians, higher natural radioactivity levels were recorded for samples from Barzava, Ranusa (Arad County) and Baita (Bihor County) mining sites. Soil samples had high concentrations of lead, uranium and thorium isotopes. Vegetation samples collected in Barzava had relatively high radioactivity due to the presence of lead isotopes (Pb-214). The water samples had concentrations in the normal variation ranges for surface waters. However, the Garda Creek, Zalea Neagra Creek and Baita mine waters were found to carry twice as much lead (Pb-214), uranium (U-235) and thorium (Th-234) as water elsewhere in Romania. High radioactive tailing samples were found at the Barzava, Ranusa and Baita sites. Among the areas investigated in Moldavia, the Crucea site, Suceava County, had the highest environmental radioactivity. The river sediments and surface water of the Crucea Creek mining site had a high content of uranium series radionuclides. In addition, soil samples from the Tulghes-Grinties and Bicazu Ardelean sites had a high content of artificial radionuclides (Cs-137 and Cs-134), which is related to the initial deposition caused by the Chernobyl accident in 1986.

- preparation of an environmental action plan for the petroleum sector;
- implementation of a pilot project (soil remediation),
- implementation of a communication strategy;
- environmental management training of staff;
- establishment of an environmental database module at the National Agency for Mineral Resources;
- purchase of environmental management training equipment.

The Environmental Action Plan for the petroleum sector was finalized in 1998. The Plan was designed to solve local, regional and national environmental problems in the petroleum sector. It identified a set of priorities and concrete initiatives for implementation over five years.

Most of the above considerations were incorporated in the National Environmental Protection Strategy and National Environmental Action Plan (NEAP). The NEAP was based on the premise that much of the environmental degradation in Romania was the result of inappropriate economic and related policies. It was assumed that market liberalization, privatization and other reforms would penalize the excessive use of energy and other resources, reducing environmental damage. These gains would be reinforced by the effects of market-driven industrial restructuring, which would shift production from inefficient plants towards more efficient and less polluting ones. Priority areas that the NEAP identified for immediate action were the reducing of emissions of lead and other heavy metals from the mineral industry and the minimization of water contamination by heavy metals and other toxic substances. Nevertheless, the NEAP's implementation has been hampered by delays in launching the economic reforms on which it was based, especially those concerning privatization and market liberalization.

Legal and institutional framework

Romania has made considerable progress in addressing environmental issues in the past five years. The Law on Environmental Protection came into force in 1995. Reflecting international standards, the Law delineates the principles underlying Romania's environmental protection programmes and specifically adopts the "polluter pays" principle and the concept of risk assessment. The Law also identifies a national system of monitoring and sets out rules governing water, air and soil quality. Environmental impact studies are required for new projects or for altering existing ones. The sections pertaining directly to the mineral industry are articles 14, 16 and 48. Article 14 describes the obligations of the new and former owners to restore environmental quality. Article 16 relates to the proscription of imports of raw or processed waste with the exception of those categories of waste that constitute a useful secondary resource of raw materials. Article 48 establishes procedures for monitoring the quality of the soil and subsoil, including plans for territorial development, exploratory drilling, geologic and hydrogeologic prospecting, and mining. Although the enforcement of the existing environmental legislation is still weak in many areas, it is attracting the Romanian Government's attention, and thus more strict enforcement can be expected in the near future.

Box 10.5. The mining closure and social mitigation project

In 1999, the World Bank approved a US$ 44.5 million loan for a mining closure and social-mitigation project that supports the Government of Romania's effort to restructure the mining sector, and thus to reduce the burden on the national budget. This will be achieved through support for (i) the closure of 29 uneconomical mines and environmental remediation at mining sites; (ii) financing social mitigation initiatives to help diversify local economies; and (iii) technical and institutional assistance for modernizing the administration of mineral rights.

The project consists of the following three components:

- Mine Closure Programme: Funds allocated to this component will primarily benefit local labour and the communities where the work is carried out. The specially established Central Group for Mining Closure is responsible for the final technical closure of mines and required environmental remediation.
- Social Mitigation Programme: This component aims at revitalizing depressed mining areas through investments for the support of small enterprises, re-training, and job creation through a more diversified local economy. The National Agency for Programme Development and Implementation for the Reconstruction of Mining Regions is the coordinator for social mitigation and revitalization of mining regions.
- Institutional Strengthening: This component will support the modernization of the administrative framework of the mineral sector. It will strengthen the professional staff capabilities of the National Agency for Mineral Resources.

The total project costs US$ 61.5 million. Financing would also include US$ 12.8 million from the Romanian Government and US$ 4.2 million from the Department for International Development (United Kingdom).

The Ministry of Waters and Environmental Protection is responsible for issuing environmental permits for mining and processing activities, and for enforcing related environmental regulations. It is organized on both national and regional levels. The regional environmental protection agencies issue integrated permits, undertake field studies, inspections, monitoring and participate in the clean up of polluted areas.

The Ministry of Industry and Mineral Resources, established by Government Decision in 1997, is the central body responsible for drawing up and implementing policies in industry, including the mining and oil and gas sectors. Within the Ministry, the Directorate of Mining and Geology is charged with the management of nine national mining companies (two for non-ferrous and precious metals, four for coal, one for uranium, one for salts and one for mineral waters). This Directorate has two major divisions: one for the preservation and closure of mines, and the other for the development and implementation of programmes in mining regions. Both divisions are involved in the implementation of the project for mining closure partially funded by the World Bank. The petroleum industry's concerns are addressed by the Directorate of Oil and Gas. Still in the ministerial framework, there is the Directorate for Environmental Protection, which draws up environmental protection regulations for industrial activities. The Directorate has been involved in the drawing up of the NEAP.

The Petroleum (No. 134/1995) and the Mining (No. 61/1998) Laws constitute the legal basis for the management of mineral resources in Romania. The Petroleum Law came into force in 1995; it imposes rules on local and foreign investors operating in the Romanian petroleum sector. In 1998, Parliament adopted the Mining Law to regulate mining activities and to encourage the exploitation of the country's mineral wealth. The Law ensures transparency in mining activities and fair competition between operators. It also encourages investments in the mining sector through fiscal and administrative incentives.

The National Agency for Mineral Resources was established in 1993 and reorganized as a body of the central public administration in 1999 by Government Decision (No. 368/1999). The Agency is the authority that manages the country's mineral resources and the national geological fund, issues licences and permits for mining activities, and establishes regulations and technical instructions for the application of the Petroleum Law and the Mining Law. It also enforces measures regarding the protection of soil and subsoil during and after the petroleum and mining activities, and approves the mine closure plan, according to appropriate environmental protection and rehabilitation requirements. In 1995, an environmental management unit was established within the National Agency for Mineral Resources. It has responsibility for developing, implementing and monitoring environmental regulations related to the mineral sector.

In 1974, a law (No. 61/1974) regarding the framework for developing nuclear activities was adopted. On the basis of this law, specific norms were established, among them the Nuclear Safety Norms for Geological Research, Mining and Milling of Nuclear Raw Materials (still in force). In 1996, a new law (No. 111/1996) on the safeguarding of nuclear activities came into force, replacing the former one and establishing the National Commission for Nuclear Activities Control as the regulatory authority. The Fundamental Radiological Protection Safety Norms were approved and came into force in August 2000. The current norms for uranium mining and milling need updating. The regulatory authority has identified important provisions to be changed. For example, the closure of active or old mines will be considered under the law as a decommissioning activity. Radiological principles for different uses of tailings, buildings, equipment and materials in areas contaminated by uranium mining and milling will also be introduced.

The Geological Institute functions as the national geological survey, performing geological work and providing geological, geophysical and geochemical information. It produces different thematic maps, including maps of mineral resources, soils, mineral and thermal waters, using geographical information systems (GIS). However, it has not yet produced information on and maps of environmental hot spots and other related problems.

The National Agency for Mineral Resources has the right to issue licences to domestic and foreign operators to work mines for up to 20 years. Exploration and exploitation licences are exclusive and can be requested by Romanian or foreign legal persons selected through a biannual public offering by the competent authority. The exploitation licence is based on an application with a feasibility study, an exploitation development plan, an environmental impact study and an environmental rehabilitation plan, which are to be approved by the local EPIs or the Ministry of Environmental Protection. Once approved by the different entities involved in the permitting process (including the Ministries of Environmental Protection and of Industry and Mineral Resources), which is a standard procedure in all countries, the permit is approved and issued by the Agency for Mineral Resources. The application is accompanied by a bank guarantee. This guarantee is negotiated according to the norms set out in the Mining Law (art. 28), which establishes that it shall not be less than 1% of the value of the development plan, taking also into consideration the related environmental impact study, including the rehabilitation measures.

The Agency also formulates regulations for the sustainable use of mineral resources and establishes legal taxes, royalties and fees for exploration and exploitation. Integrated environmental agreements (construction phase) and permits are usually issued by the local Environmental Protection Inspectorates.

Although Romania's Government imposes penalties on polluters, the collected taxes and fees are not sufficient to cover the costs of all environmental protection programmes. The State budget provides some funds for environmental impact mitigation and rehabilitation, but they do not meet the amounts required. The 1995 Environmental Law introduced the Environmental Fund, which will collect the fines and fees assessed from polluters and use these funds for environmental protection and rehabilitation projects. The Law on Environmental Fund has recently been approved (No. 73/2000), but still requires the mechanisms for its full implementation. Current expenditures for environmental protection in Romania are very low, reflecting the country's economic situation.

Environmental monitoring

Environmental monitoring in mining regions is a huge task, which has been developed by the authorities, notably by local environmental protection inspectorates (EPIs) and Apele Romane. The EPIs have their own local network for environmental monitoring, with the emphasis on air monitoring. The information collected is sent to the Ministry of Waters and Environmental Protection and other EPIs through a common information system, but GIS is not yet in place. The local laboratories of Apele Romane are responsible for monitoring surface waters, groundwater and industrial waste-water discharges. They also perform occasional analyses of soils and sediments.

Their network covers the littoral and the main river basins of the country, including the Mures and Somes-Tisza river basins, where the mining industry is highly active and which are among the most polluted by heavy metals. Sampling is generally done monthly or every two months for groundwater and surface waters. The monitoring of waste waters from mining and processing is planned monthly in previously selected mines. In

Regulatory and economic instruments

Figure 10.2: Mining sector's expenditure on environmental protection, 1997-1998

Note: * in current prices
Sources: Statistical Yearbook of Romania, 1999 and NEAP 1999-2000.

general, the selected mines are monitored 2 or 3 times a month. The agencies performing environmental monitoring are facing problems related to technical capacity, such as old or inadequate laboratory equipment and a lack of mobile devices, which impedes the operation of a more effective monitoring system. The analytical standards used are not harmonized with European standards; however, sometimes they are even stricter than the international ones (ISO 14000 series and EMAS).

The National Commission for Nuclear Activities Control monitors environmental radioactivity. It has a network of 46 observation stations spread over the country's territory to monitor radionuclide concentrations in waters, soils and vegetation. In uranium-mining regions, the surroundings of mines and tailing ponds are sporadically monitored. The Commission also faces problems related to obsolete equipment, which in most cases is operated manually.

10.4 Conclusions and recommendations

While considerable progress has been made in developing the legal and regulatory framework, the concepts of the sustainable management of mineral resources and related mechanisms are not well understood in Romania, and are neglected by high-level decision makers. They still assume that only after economic development and stability are achieved will it be possible to pay attention to environmental issues such as clean production and investments in environmental improvements. An effective and workable system of environmental management will require an understanding of the concept of the sustainable use and development of the country's mineral resources and a greater participation by those involved in the management of mineral resources. Improvements in the general environmental quality in mining regions since 1991 have been largely associated with the reduction in industrial activity, and could easily be reversed once the economy starts to recover. Many areas in need of urgent action have already been identified by the NEAP and specific sector plans have been developed and approved. However, their implementation is quite slow probably due to the absence of the requisite mechanisms. It has recently been decided to establish an environmental fund, but no practical steps have so far been taken (Chapter 3). A tax system for environmental permits at the level of EPIs has also been set up. Both represent alternative economic tools that could be used for project implementation.

Recommendation 10.1:
The Ministry of Industry and Resources should accelerate the implementation of projects selected in the National Environmental Action Plan for the mining sector. Every effort should be made to obtain the necessary funds and reach targets within an established timeframe for each project. This process requires a rapid development of mechanisms to implement and operate an environmental fund. (See also Recommendation 3.4).

The introduction of better environmental management and control in mining should be a matter of national concern because of the serious

environmental and health risks involved. The prevention of pollution, waste minimization and the efficient use of mineral resources are the main goals of a modern and effective management of mineral resources. At present, there is a general lack of environmental management systems in mining companies operating in Romania, and international mining standards and regulations are not applied. The Commission Decision of 16 April 1997 recognizes the ISO 14000 series (which establishes specifications for environmental management systems) to meet the provisions of the EMAS European regulation (1836/93/EEC), which sets voluntary eco-management and audit schemes (EMAS) for industrial companies. According to these regulations, companies are required to adopt an environmental policy, conduct an environmental review of their operations, introduce an environmental programme and management system, and provide environmental performance reports to the public. These are basic requirements that could be applied immediately by the competent authorities.

Recommendation 10.2:
The Ministry of Waters and Environmental Protection should approve new mining plants based on international mining standards and practices. The Ministry should encourage the introduction of environmental management systems in existing plants. It should also promote ISO 14000 and EMAS systems, in particular for mining activities, through the creation of national procedures and schemes. In cooperation with the Ministry of Industry and Resources, environmental management training should be regularly provided to professionals working in the mining industry, thus contributing to industry-wide best practices harmonized with EU standards.

In parallel with the adoption and implementation of an environmental management system, it is necessary to introduce cleaner technologies in mining and mineral processing. These technologies focus on the source of pollution (the process), on recycling where possible, and on reducing pollution by treating air and water in order to minimize the environmental impact. Currently, many mining companies use outdated production technologies, have old and obsolete waste-water treatment facilities, and the environmental training of staff is minimal or non-existent. Treatment facilities for air emissions from metallurgy are usually inefficient. As a consequence, mining and processing tailings, waste-water discharges and air emissions are serious sources of chronic environmental pollution and potential risk spots. This situation could be improved and controlled if better technologies were put in place in major mining industrial centres.

Recommendation 10.3:
The introduction of cleaner technologies in mining and metallurgy, with realistic targets and timeframe for their implementation, and staff training in the new practices should be seen as a matter of priority. Cleaner production centres specializing in the mining and metallurgy sectors should also be established. See also Recommendation 8.2.

There are many abandoned mines and tailing ponds in Romania, which are a danger to human health and the environment. They are potential sources of pollution by heavy metals, radionuclides and other toxic substances. At most of the sites where all operational activities have ceased, the closure has not been adequate. In respect of such abandoned sites, especially those that do not have an "owner" or whose owner cannot be identified or is not deemed capable of meeting the costs of proper closure and decommissioning, there is a real problem of where responsibility for their management lies. In such circumstances, the costs of remediation will need to be met in a different way. The operations that are still ongoing, but for which no closure plans or rehabilitation have been agreed, are also of concern. Therefore, possible approaches to regularizing the situation need to be found urgently. In this framework, the first thing to be done is to conduct an inventory of such sites and prioritize them in terms of environmental and health risks.

Recommendation 10.4:
The Ministry of Waters and Environmental Protection together with the Ministry of Industry and Resources should undertake a detailed assessment of abandoned and active mining sites and tailings in Romania. It should include a risk study for each mining and tailing pond hot spot in order to identify short- and medium-term priorities. (See also Recommendation 11.4)

Environmental monitoring is a high priority in Romania. The inability to monitor emissions and environmental effects will defeat any attempt to implement an effective environmental management system. Despite the efforts made by the responsible agencies to develop high quality monitoring, most of them have to face the lack of adequate equipment, especially of mobile devices, transport and computers. The methodology used for data

collection and transmission between agencies and units is not standardized. Many laboratories also need to update and complete their equipment. The current monitoring network for toxic and radioactive wastes, in particular uranium-mining and milling wastes, needs further development and modernization. It still uses obsolete equipment that should be replaced by high performance automated equipment. In addition, the self-monitoring principles are not enforced and the entire system of self-monitoring of water and air pollution at industrial plants, as stressed by the integrated environmental permit, needs updating.

Recommendation 10.5:
Romanian laboratories should be accredited and current analytical standards harmonized with European regulations. The Ministry of Waters and Environmental Protection should furthermore strengthen cooperation among the institutions involved in monitoring. The development of a modern information system is necessary to facilitate the exchange of environmental information that could be used for decision-making.

The Baia Mare accidental spill had serious immediate environmental impacts. It also affected the livelihoods of people in the fishing and tourism sectors. However, the risk of using cyanide in gold leaching in north-west Romania, including the exposure to cyanide and hypochlorite (the antidote) and its possible environmental and health effects, still needs investigation and clarification. An assessment of chronic heavy metal contamination in this region is also necessary. The Baia Mare Task Force (See Box 5.1, Chapter 5) has not determined the long-term damage to the ecosystems affected. It is extremely important to estimate the damage to the rivers' ecosystems, to determine the pathways of pollutants into the life cycle and into the food chain and also to assess groundwater and well contamination in Maramures County with cyanide and heavy metals. At the same time, preparedness, awareness and response capacity in emergency situations require a detailed review by the public authorities as well as by the mining companies themselves. Experts from governmental agencies and local authorities, interested mining companies and NGOs need training to improve their response efficiency in emergencies.

Recommendation 10.6:
An extensive follow-up study of the long-term pollution from mining and smelting activities should be developed as a joint initiative of the Ministry of Industry and Resources and the Ministry of Waters and Environmental Protection. In parallel, the APELL process (Awareness and Preparedness for Emergencies at Local Level) should be introduced and an emergency preparedness plan, based on fail-safe and contingency concepts, should be adopted.

PART III: SECTORAL INTEGRATION

Chapter 11

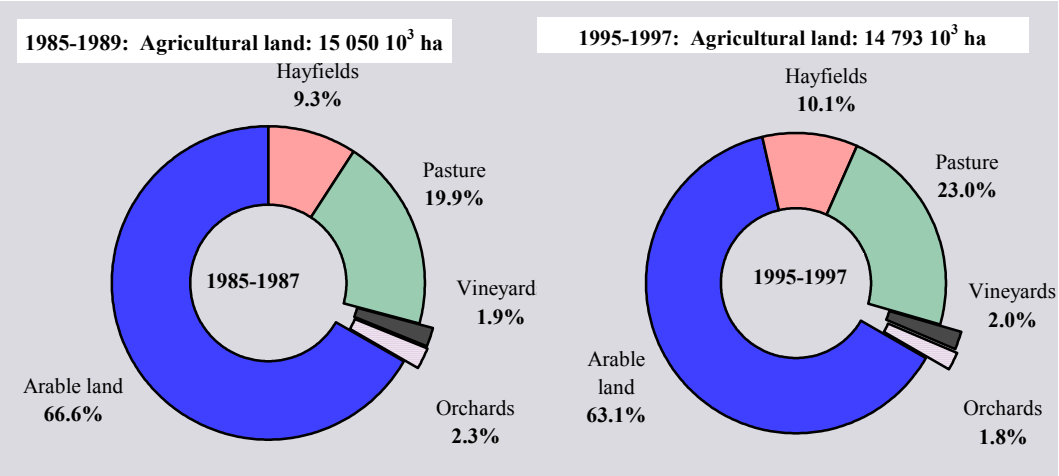
ENVIRONMENT AND AGRICULTURE

11.1 Present situation

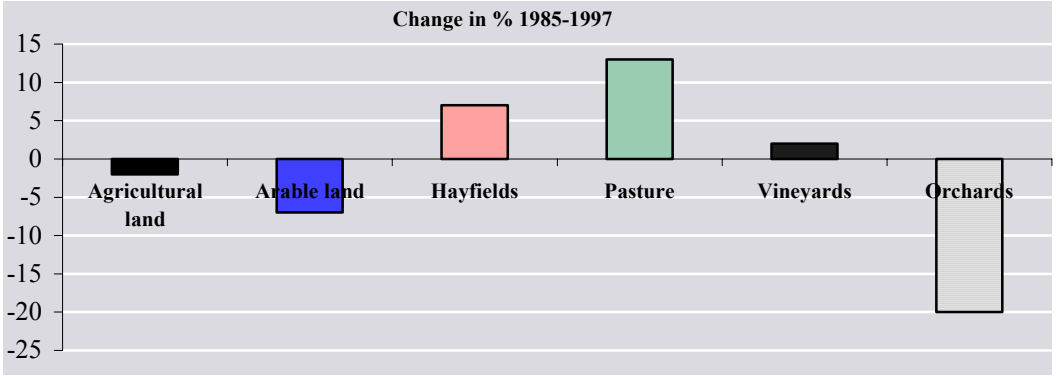
Economic, physical and natural features that characterize Romania's agriculture

Historically, Romania was the breadbasket of the Ottoman Empire and later of central Europe. Nowadays, Romania has the potential for profitable, competitive, high-yield agricultural production, and is considered as a typical agricultural country with 62% of its total surface devoted to agriculture, which contributes some 15 to 20% to GNP (16.1% in 1999, Figure I.3).

Figure 11.2: Agricultural land use, 1985-1997



Source: OECD.

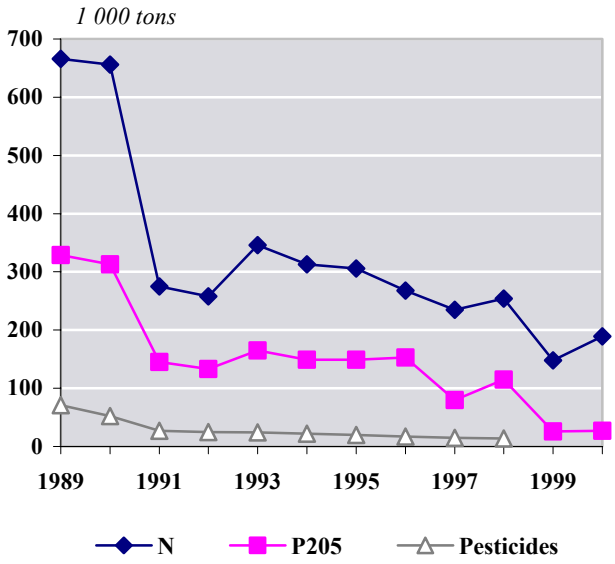


Source: OECD.

Figure 11.1: Areas affected by drought

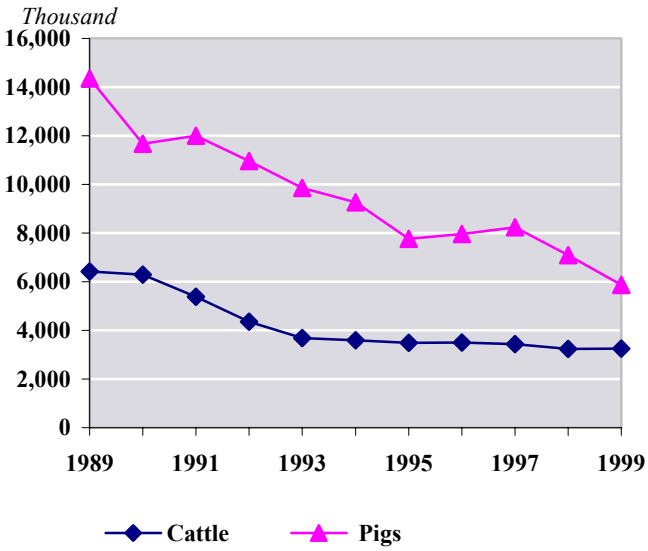
The plains represent 33% of the total area, the mountains, 30% and the hills, 37%. The most fertile soils [mollisols, including fertile chernozems *(26.7% of the soils),* alluvial soils, brown soils] are to be found in the plains of Valachia, the hills of Moldavia, the Dobrudja and the western plain (Banat). The plateau of Transylvania and certain parts of Muntenia are only moderately fertile (brown soils) because of salinity problems. Mountainous soils and the soils of the Danube Delta are the least fertile. The Dobrudja is a fertile hilly plateau located between the Danube and the Black Sea (see map, Figure 11.1).

Figure 11.3: Trends in the use of pesticides and fertilizers, 1989-2000



Sources: Env. Statistic al Romaniei p. 40-1and News Bulletin MAF 8/2000 for 1999 and 2000

Figure 11.4: Livestock, 1989-1999



Source: Monatshefte über die österreichische Landwirtschaft 3/00, 218 quoted in Danube Pollution Reduction Programme

Box 11.1: The Pig Farming Industry in Peris

Founded as a State-owned company in 1970, Romsuintest in Peris (Ilfov county, north of Bucharest) has since 1991 been a private company belonging (also) to SIF Muntenia, employing 900 workers, with a potential capacity of 159,000 and a current number of 100,000 fattening pigs. It is both a very large pig-fattening complex and the only research institute for pig-breeding in Romania. The complex is completely integrated from pig fattening to the meat-processing factory, with a slaughterhouse (capacity of 600 pigs/day, now 300) and research is undertaken at all levels with the most modern tools (artificial insemination and embryo transfer): in genetics (a hybrid breed of its own, the "line-345 Peris", has been produced), reproduction, feeding and meat quality. Animals are provided to other pigsties, including small producers in the vicinity of Peris. 2000 was a very difficult year, due to the outbreak of a virus disease causing the loss of piglets and the high price of domestic cereals.

The industrial facility does not have any agricultural land for the disposal of manure. The effluents of the pigsties, together with those of the slaughterhouse, are directed to a waste-water treatment plant, which also collects waste water from the Peris hospital and school (but not from private houses - Peris has 7,000 inhabitants). There, the sludge (2,500-3,000 m^3/day) is first separated mechanically - with brand new German equipment - and then settled in two stage basins. The final solid part (50-60% dry matter) is sold as organic fertilizer to neighbouring farmers. The liquid part is stored in tanks and in the main irrigation channels, where it evaporates in the summer, weather permitting. Previously, it was used for irrigating 1,540 ha, a solution no longer possible following land redistribution. The present liquid disposal situation is far from satisfactory. The way that the large quantities of "solid slurry" should be applied on agricultural land is not explicitly specified in the sales contracts and the farmers seem to be ignorant about the correct use of slurry. The heavy metal (Cu) content of the slurry does not seem to be a matter for concern.

The pig complex contributes to the pollution of the Ialomita River, which is classified "D" long almost its entire length (see Chapter 7).

Several development options were envisaged, including that of closing down the complex. One of the objectives is adjusting the number of animals to the capacity of the waste-water treatment plant and of the fields used for spreading the residues. For 159,000 pigs (full capacity), respecting the EU Nitrate Directive (no more than 170 kg N/ha used by the plants), would require 7,014 ha of agricultural area. Over the fertilization limits, the fields must be considered as landfills, with the risk of accidental contamination and health hazards. The same amount of Nitrogen is either accumulated as organic compounds in the soil, or volatilized in the air (NH3), or lixiviated or run off into the waters and represents a challenge to the environment. The problem of P accumulation in the soils should be also examined. The relevance of building a sophisticated waste-water treatment plant (within the framework of the Danube Partnership programme) must be re-examined, as – according to the EU Nitrate Directive - the nutrients, of treated or untreated slurries, must further be reused as fertilizer on agricultural land.

Because of the continental climate, summers are dry and hot (mid-July to mid-September), and the soil moisture deficit is relatively high in the south – south-east and in Moldavia in the north-east (less than 600 mm rain and more than 10°C yearly averages), so that irrigation is necessary to ensure regular high yields. The western plain is also hot with a little more rain (up to 750 mm).

The transition from a centrally planned to a market-oriented economy led to a switch in agricultural land use (see Figure 11.2), and compared to 1989, the agricultural area decreased, the grasslands extended at the cost of arable land and 103,000 ha was turned into forests, the major cause of the reduction in agricultural land.

Main characteristics of agriculture production

Of the 62% of Romania that is agricultural land (14.8 million ha), almost 63% is arable land, 2% orchards, 2% vineyards and 33% is pastures and meadows. The most important crops are maize (Romania is the second maize producer in Europe after France) occupying one third of arable land, and wheat and barley, followed by sunflower and soya. Potential yields in certain regions can reach as much as 8.5 ton/ha for maize and 4.3 ton/ha for wheat, but actual yields are not higher than 4.0 ton/ha. Other major agricultural products are sugar beet, potatoes, vegetables, milk and eggs. Romania also has very good conditions for orchards and vineyards, although their production has diminished in the past 15 years.

Although there were many changes in the ownership of agricultural capital after 1989, agricultural production stabilized after 1994. With uneven yields in the early 1990s, agricultural production contracted again by 7.6% between 1997 and 1998; cereal production was reduced by 25% (20 to 15 million tons) due both to the drought and the 9% reduction in cultivated surfaces. The year 2000 and the beginning of 2001 were again times of severe drought and the effect on GDP is expected to be serious: a first estimate gives a production of 4.38 million tons of wheat and rye as compared to the yearly average of 5.81 million tons in the period 1995-1998.

Overall, the use of fertilizers and pesticides has declined dramatically since 1989 (Figure 11.3), and organic fertilizers are used in very small quantities, resulting in lower production yields. Crop production is dominated by cereals (maize and wheat: 70%) and crop rotation does not secure the food supply, nor meet market demands or ecological criteria.

As for livestock, most of the herds were halved between 1989 and 1997 (the animals were distributed to the population and slaughtered), except for an increase in horses used for animal traction in small farms. However, in 1998, animal production still represented 46% of total agricultural value (See Figure 11.4 livestock trend, 1989-1999). Milk production, which has always been a matter for smallholdings for private consumption increased constantly during the transition and was less affected by the bad years. Meat production diminished by 11%, and processing units worked at only half of their capacity.

The pig industry is one of the main sectors of Romanian animal husbandry. It represents an important added value for domestic cereal production which is used for feeding the animals. It covers about 50% of the population's meat consumption. For a long time, meat and meat products were an important part of Romania's exports. In 1998, the imbalance between supply and demand on the world market was particularly marked in the pork sector, due to the collapse of demand in Asia and the Russian Federation, and the EU increased export subsidies, which resulted in increased imports even in producer countries like Romania. In 2000, the price of pork was low all over Europe and the pig-fattening sector was under the pressure of strong competition and in financial difficulties. Today all the large pig farms belonging to the Suinprod Company have been closed down (76% of the country's capacity) and herds have been reduced in the other pigsties. A few large plants are still operating (See Box 11.1).

While agriculture remains a traditional pillar of Romania's economy, there was a certain drop in agriculture's share of total GDP (from about 20% to 16%) in 1998-1999 (see Annex II).

Landownership, farming and agriculture practices

The privatization process

During the socialist era, the State (Ministry of Agriculture) controlled 90% of agricultural production; 55% was in the hands of collective farms and the rest in large capital-intensive State farms. Private farming was tolerated only in the mountainous regions where natural conditions were not suitable for large scale production. After Law No. 18/1991 was passed, the land of collective farms was privatized. The land was returned to its former owners or their heirs or distributed to agricultural workers. At the beginning, there was a limit of 10 ha per family. The limit was raised to 50 ha per family in the second redistribution round of 1997. However, it took a long time for the new owners to get regular land papers and this was an obstacle for obtaining loans and for creating larger and more efficient farming structures. By 1998, 75% of the owners had received their property titles. In 1999, a law detailed owner rights. The 1998 Law on the Land Market increased from 100 ha to 200 ha the maximum size that can be bought per family, thus encouraging movements on the land market.

Farming structures and practices

Privatization of the cooperative sector led to the crumbling of the agricultural area and the creation of more than 4 million private households on the newly privatized plots with an average of little more than 2.2 ha dispersed in 4 or 5 plots over 60% of the land. Only 0.2% of owners own more than 10 ha (2% of the land). More than half of the new owners are of retirement age or do not live in the countryside and rent their land to State farms or machine-service units. A great number of farmers have neither the knowledge nor the strength to run an independent farm and concentrate on subsistence farming often as a secondary professional activity. However, land is farmed on a larger scale too; 40% of the land is used by family associations, agricultural societies or State farms: their 30% share of land has hardly changed since before transition (see Table 11.1). Also, informal agreements between owners tend to create larger farming structures than officially registered. Villages depend greatly on subsistence farming on plots close to the village centre, while remote plots may remain fallow.

Table 11.1: Organization of agricultural production, 1996

	Number	Surface	Average surface	Cattle	Pigs
		1 000 ha	*ha*	*1,000*	
Agricultural companies with legal status	3,759	1,752	466	n.a.	n.a.
Family associations	15,107	1,440	95	n.a.	n.a.
Individual households	3,625,758	8,348	2	3,103,000	4,766,000
State ownership	490	1,652	3,371	363,000	3,469,000
Public ownership	3,500	1,598	748	n.a.	n.a.

Sources : Business opportunities in Romania's agriculture,1998;
Changes in the Romanian Agricultural and Food Sector, MAF, 1997. Annual Report, Bucharest, 1998.

Consequently, Romanian agriculture can be characterized as two-tier: on the one hand there are smallholdings under-equipped and hardly viable for a full-time farmer who must hire the services of a machinery company (*Agromecs*); and, on the other hand, large farms with equipment and employees. As a result, only 4% of the new landowners use machinery; the others must rely on animal traction (36%) or manual labour (60%). Most of the machinery is now obsolete.

Subsequently, there have been changes in agricultural land use such as a 380,000 ha increase in pastureland, an increase in land for hay and vineyards of over 120,000 ha and a decrease in orchards of some 43,000 ha. A reduction of 770,000 ha in total arable land was registered, whilst the non-agricultural area increased by some 400,000 ha (more than half of which for buildings, roads and non-productive land).

The weight of the private sector in agricultural production increased constantly from 61.3% (1990) to 97.2% (1999), and has always been much higher than in other sectors. By the end of 1997, the private sector owned 93% of the cattle, 96% of the sheep, and 64% of the pigs.

11.2 Environmental problems in agriculture

Impact on water

Diffuse and point source pollution from agriculture activities

There are two categories of agricultural pollution: (i) *pollution from point sources*, especially zootechnical units (i.e. large animal farms, see Box 11.1) with large emissions and high concentrations of gases, waste water and solid waste; and (ii) *diffuse pollution* due to emissions of chemical substances applied in agriculture: fertilizers, agro-chemicals, but also animal waste once it has been spread on agricultural land. Water quality is measured at point sources of pollution. However, the existing monitoring cannot determine the quantity of pollutants coming from diffuse agricultural pollution into surface waters and groundwaters, and it has to be evaluated on the basis of models. Pollution peaks can have catastrophic effects on river life, which is the case for river stretches in the vicinity of serious polluting factors (point source pollution) such as Bistrita, Bahlui, Trotus, Ialomita, Dambovita, Arges, Olt, Jiu, Bega, Bega Veche, Somes.

When they enter Romania, the Danube waters have class 2 quality (See Chapter 7 and Table 7.4) and contain high concentrations of organic matter, nitrates and phosphates, and pesticides. Diffuse pollution from the Romanian tributaries of the Danube (mainly Jui, Olt, Arges, Ialomita, Siret, Prut) is also noticeable. They carry high concentrations of nitrates and phosphates and organic matters of agricultural origin. Their negative impact on the ecological systems is particularly serious in the Danube Delta and the Black Sea, affecting their biodiversity. Significantly high concentrations of organo-chlorinated pesticides (HCH, DDT) are found in sediments and in waters all along the Danube. They are expected to be released slowly into the Danube Delta and Black Sea and are detectable in fish in increased concentrations.

Lake spas famous for the therapeutic qualities of their waters and muds (Techirghiol, Amara, Balta

Alba) show a visible tendency toward worsening of quality (eutrophication, degradation of organoleptic characteristics) due to polluting factors conveyed by the hydrographic basins (irrigation). The levels of organo-chlorinated substances from pesticide use have increased in recent years and in most lakes concentrations are above the admissible limit (i.e. 0.1 ppb of the active part of pesticide compound and/or of its metabolites).

Investigation of *groundwater* (1992-1994) showed that 25% of hydrostructures are contaminated with nitrates and phosphates in a number of plains and depressions, with values above the permissible limit for drinking water of 45.0 mg/l for nitrates and 0.5 mg/l for phosphates. In some areas, concentrations reaching 100 to 300 mg NO_3/l were frequently reported in 1996. Polluted areas correspond to the surfaces where irrigation was practised on a large scale (Mehedinti, Dolj Calarasi, Constanta, Tulcea) and affect mainly groundwater catchments in rural areas. The causes of aquifer contamination with nitrates are complex; they include over-fertilization, bad agricultural practices and soil washing with precipitation of nitrogen oxides discharged in the air by the application of chemical fertilizers on certain categories of arable land. The same aquifers are also polluted with phosphates (PO4), but the areas are somewhat smaller. Estimates show that in the Danube flood plains there is a surplus of 48 kg N, and 76 kg P per ha, their use efficiency being respectively 65% and 25%.

The most intensive cases of multiple quality depreciation (ammonia, organic substances) were identified inside rural settlements due to a lack of sewerage infrastructure and also to manure discharge from the stables. Typically, each household has 2-3 cows, 2-3 sows with fattening pigs and poultry, confined to a small area around the house. Livestock housing systems are rudimentary with an accumulation of solid dung and urine soaking into the ground. Solid dung is often dumped together with waste by the roadside or in watercourses.

Pollution from large pig farms

The production capacity of large pig-breeding facilities was increased to satisfy domestic demand and huge export plans, but did not take into account the disposal of the concomitant manure. The treatment of waste water could not be ensured because of the low profitability of the farms. In the past decade, treatment facilities have not been maintained and rarely operated in most farms. The liquid waste is discharged directly into the nearby rivers.

The number of accidental spills from animal farms, which was as high as 25% in the early 1990s, has decreased since. However, the effluents from very large farms, such as CONSUIN Beregsau (capacity of about 500,000 pigs), are 100 times higher than the limits set in the water permit and are a major source of heavy continuous pollution of the waters in the region (hydrographic basin *Bega-Timis-Caras,* 1999). The Bega Veche River is thus classified "D" (see Chapter 7). The Danube pollution reduction programme lists 28 agricultural hot spots. For example, the Peris and the Ulmeni pig complexes are in the highest priority class with transboundary pollution effects and Beregsau in the medium priority (see Box 11.1). Instant pollution peaks on river sections located directly downstream from the discharges are frequent and have a catastrophic effect on the aquatic life in the Bega Veche and Ialomita, for example (see Table 11.2).

Air pollution

Agriculture has the greatest responsibility for methane (CH_4) (animal farms), nitrogen dioxide (NO_2) and ammonia (NH_3: over 95%) pollution of the air. The emission of NH_3 has been reduced by a third since 1990, but still causes excessive alkalization of the rainfall in some regions (*Air quality management performance report*). There is no doubt that very large pig farms play a role in intensive local air pollution. Specific odours also pollute, but are not (yet) considered an issue. In 1997, Romania complied with the NH_3 emission ceiling (210 ton/year, i.e. a 30% decrease as compared to 1990) set for 2010 in the Protocol to the Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone (signed December 1999).

Soil Protection and land reclamation

In practical terms, 37% of the arable land meets all the requirements for sustainable agriculture. Between 1960 and 1989 there was a vast campaign promoting the increase of cultivable land; pastures, hayfields and even forests were converted to arable land to increase agricultural production. Primarily salty soils or soils with other natural deficiencies were the object of improvement work, which was

Table 11.2: Pig farms rehabilitation projects

Name	Location	Number of animals	Discharges * COD	BOD	N (ton / year)	Rehabilitation project	Use of water/slurry	Cost *million US$*
RO19 high priority ROMSUIN TEST Peris	Ialomita river	159 000 pigs slaughterhouse: 300 pigs/day	…	25.1	38	Upgrading of WWTP and waste disposal	Water: irrigation Slurry: disposal on agricultural land (fertilizer)	**1.3**
RO62 high priority S.C. ULMENI Oltenita	Arges river	300 000 pigs 3 500 cows slaughterhouse: 30 000t/y	**260**	**575**	**10.23**	Expansion of WWTP Drying beds	Water: treatment plants Slurry: disposal of manure/ spreading	**0.9**
RO61 medium priority CONSUIN BEREGSAU Timis	Bega Veche	500 000 pigs slaughterhouse	**2,247**	**3,043**	**818**	Construction of WWTP	Water: today direct to river; future WWTP Slurry: spreading	**0.6**

Source: Danube Partnership Programme, Joint Action Programme for the Danube River Basin.

* Danube Pollution Reduction Programme. Technical reports.

costly and energy-consuming, but yielded poor results. Land with a highly degradable potential, especially degraded land, was cultivated and after transition abandoned (770,000 ha of agricultural area and 310,000 ha of arable land) for reafforestation (see Chapter 9). In general, land with a slope of over 12% is not cultivated as erosion and landsliding risks are too high, although in some cases cultivation still takes place.

Hydromorphism and salination are the main natural phenomena of the great plains. Land degradation there has been classified as low. Medium and heavy degradation are specific to mountains and hills. Landslides and torrent erosion are especially active in hills, where the substrate is argillaceous or flysch (Transylvanian and Moldavian plateaux, southern and eastern foothills of the Carpathians).

About 80% (12 million of the 16 million ha) of agricultural land is subject to one or more negative influences such as erosion (average loss of 16.5 ton/ha/year), marshing, the increase of salt content, compaction, acidification and chemical pollution (pesticides, heavy metals, fluorides, oil, etc.). Wind erosion, though not very significant, is likely to increase due to the recent massive deforestation in high-risk areas.

Irrigation and drainage

Drought and excessive humidity seem to be increasing sources of concern for agricultural production. Droughts in Romania have a periodicity of 12-15 years with 1-3 extremely dry years: in the last period (1982-1996), the droughts in 1988 and 1991 were the worst ever and affected a larger area than previously (Figure 11.1). Ten per cent of the country or 2.2 million ha, has a rainfall to potential evapo-transpiration ratio of less than 0.65 (definition of aridity according to the Convention on Desertification) in eastern Muntenia, Dobrudja and southern Moldavia, and 40% of the agricultural land is classified as dry according to the Aridity Palfay Index (6 to 8). However, the intensity of drought depends on soil quality, and most of Romania's soils are deep with a shallow groundwater table, have slight or moderate vulnerability to drought and are suitable for dry farming. Irrigation is indicated only in the sandy soils in the south (3% of the drought-affected area), where farmers' livelihoods depend on irrigation (Dobrudja), and for vegetable plots around urban areas.

By contrast, in the Vrancea depression with a relatively favourable rainfall regime (over 500 mm/year) the land was desertified within only 50 years, solely because of deforestation and bad agricultural practices on the slopes.

A US$ 25 million irrigation system was constructed in the period 1950-1980 on 3.2 million ha of arable land. The Danube provides 75% of the water. Other sources are the Olt, the Siret, the Prut. Areas were equipped with giant or very large systems, covering between 37,000 ha and 126,000 ha, which are no longer suitable for the average farm size. To regulate water flows, 1900 discharge lakes (13 billion m^3 in 1996) have been created with diversion canals to transfer water from basins with an excess to those with a water deficit. Only 15-20% of the system was operational in 2000 (in 1997 even only 4%), instead of the 60% of potential capacity in 1989.

In agriculture, water consumption grew steadily between 1970 and 1989 (from 3.8 billion to 9.03 billion m^3) but then decreased drastically to a low of 1,026 billion m^3 in 1997, because water consumers could not afford irrigation despite the fact that the State financed the structure and the price for irrigation water was low. Water consumption for livestock farming decreased by 60% between 1989 and 1997. Irrigation is facing difficulties due to the malfunctioning and deterioration of the equipment causing excessive losses throughout the water-supply networks: 40-50% of the water used in irrigation systems can be lost through seepage, and the inefficient irrigation technology causes percolation. Beside the unnecessary use of water, which is serious in view of the country's limited water resources, these losses cause an unnecessary consumption of energy.

On the other hand, 3.9 million ha are affected by excess humidity, 3.2 million are drained but not efficiently. In the Danube flood plains, 450,000 ha were protected against flood, and drained. Together with other large hydro-technical works this caused a marked change in the hydrological regime of the streams and their ecosystems (marshes).

With a loan from the World Bank (1994), the Government of Romania has been re-evaluating the requirements of the irrigation and drainage sector. The aim is to rehabilitate and modernize this sector in view of the new economic environment, so as to ensure a constant yield for the domestic and export markets. According to this re-evaluation, the irrigation service should be at least partly privatized and water users' associations established (Governmental Ordinance No. 147/1999). The total cost would amount to US$ 618.2 million.

Until the year 2005, 203,000 ha irrigation systems in the Danube plain would be maintained and 1.361 million ha rehabilitated. Certain hydro-technical works, such as the Siret-Baragan Canal, are still in progress and should be completed.

As for drained land, modern policy is to return part of wet areas to the original bog state; the WWF project "A Green Corridor for the Danube" is not only an ecological rehabilitation project but also aims at recreating large bog areas where nutrients can be naturally recycled instead of needing costly waste-water treatment plants.

Land use and soil degradation

Surface and depth erosion and landslides affect 7 million ha a year with half of it reaching as much as 20-25 tons/ha/year. The affected regions are the Moldavian Plateau, the Subcarpathians, between the valley of Trotus and Olt, the Getic and the Transylvanian Plateaux. Wind erosion affects the western plains (Carei, Banat), and the southern and eastern plains (Oltenia, Baragan, Tecuci) and is considered as a growing risk because of the excessive felling of shelter belts and forests. Moreover, the south-eastern plains are considered as being in the process of aridization due to frequent drought (see above). Compaction and crust formation are also the result of machinery not being used at the right time. It has been estimated that soil erosion causes a loss of yield of 60 kg/ha per cubic metre of eroded soil and that compaction causes a decrease in maize yield of 130 kg per 0.01 g/cm^3 increase in soil bulk density. Other factors reducing soil fertility are of natural origin. Furthermore, production capacity, even of fertile soils, has been diminished by the unreasonable use of chemicals in the past (fertilizers, pesticides) and by irrigation.

Soil erosion control works have been carried out on 2.2 million ha, but on 0.4 million ha are unusable due to improper parcelling in the course of land restitution or have been destroyed by inadequate cultivation methods (ploughing downhill towards the valley) or because of the poor state of land maintenance, or illegal and massive tree felling.

Table 11.3: Restrictions on the production capacity of the agricultural soils

Factor	Affected agricultural land			
	1000 ha		*as % of total agricultural land*	
	1992	**1997**	**1992**	**1997**
Frequent drought (lack of irrigation)	3,900	7,100	26.4	48.0
Excess moisture	900	3,781	6.1	26.0
Water erosion	4,065	6,300	27.5	43.0
Landslides	700	702	4.7	5.0
Wind erosion	387	378	2.6	3.0
Excessive skeleton (stony)	300	300	2.0	2.0
Excessive salt content	600	614	4.1	4.0
Soil compaction and plough sole	6,500	6,500	43.9	44.0
Natural soil compaction	2,060	2,060	13.9	14.0
Crust formation	2,300	2,300	15.6	16.0
Small and very small humus content	7,114	7,304	48.1	49.0
Strong and moderate acidity	2,350	3,420	15.9	23.0
High alkalinity	165	220	1.1	1.0
Weak supply of mobile phosphorus	4,475	6,289	30.3	43.0
Weak supply of mobile potassium	491	…	3.3	1.0
Weak supply of nitrogen	3,438	4,883	23.2	33.0
Microelements deficiency (Zn)	1,500	1,500	10.1	10.0
Chemical pollution	900	900	6.1	6.0
Oil and salty water pollution	50	50	0.3	0.3
Pollution from wind-borne substances	147	147	1.0	1.0

Sources : Review of Agricultural Policies. Romania. OECD 2000;
Phare, Environmental Protection Strategy, 1996.

Soil pollution

In Romania, large areas of agricultural land are registered as polluted by heavy metals and oil (see Chapter 10). Rehabilitation measures can be evaluated and proposed in studies financed by the land reclamation fund. Polluters should be made to pay for the clean up, but it is extremely costly. It is, therefore, more advisable to restrict agriculture in these areas.

Impact of agriculture on biodiversity and natural habitats

With 62% of arable land a large part of Romania is covered by *agroecosystems*. In contrast to grassland, they do deserve protection because they may host threatened animal species and because of the cultivation of local varieties (agrobiodiversity), such as extensive orchards. Biodiversity in the Romanian plains and their arable ecosystems has suffered in the past 30 years from large-scale mechanized farming with the removal of hedges and shelter belts, the development of irrigation systems and land improvement works, the increase of cultivated land to the detriment of grassland areas, and finally the inappropriate use of agrochemicals.

Human activities modified steppe grasslands in particular and created large areas of secondary natural grasslands (mesophilous, hygrophilous and xerophilous) in the mountains and in the hills. Steppes and mountain pastures are used for stock farming, may contain rare or threatened species and present a landscape value. Overgrazing due to non-respect of the carrying capacity and the lack of grazing rotation led to the deterioration of the grassland and to erosion on the slopes.

The loss of *wetlands* converted to agricultural land (400,000 ha in the past 50 years, 80,000 ha along the Danube river) has been particularly dramatic. Flooding regimes have been modified, and agricultural run-off threatens biodiversity especially in the wetlands of the Danube Delta.

Box 11.2: Natural and cultural heritage in Romania, a basis for rural tourism

The beautiful scenery of the rural areas, the variety of landscapes, the multicultural environment and the uniqueness of natural and cultural monuments are all attractive assets for ecotourism. Romania has one of the most important folklore cultures in Europe, which varies considerably from region to region, for instance in traditional architecture, costumes or folk music and dances. In an unspoilt rural environment, Romanian village life provides both fascination and a restful time.

Traditionally, foreign guests were hosted in homes and there is a large potential for formalized rural tourism. The National Association of Rural Ecological and Environmental Tourism ANTREC (2,225 members and 30 local offices), founded in 1994 and a member of the European Federation of Rural Tourism EUROGITES, is the national organization for tapping the potential of rural tourism. There are 7,800 rooms in 120 localities on offer, classified according to their standard by Governmental Tourism Board inspectors. The food offered to the tourists is produced locally but not necessarily strictly "organic".

Nowadays most such homes are located in Romania's mountainous areas. The cradle of rural tourism is undoubtedly Bran-Moeciu in the mountains near Brasov in the vicinity of the ancient fortress of Prince Vlad Tepes, the historical Dracula. The Danube Delta is well-known throughout the world for its ecological specificity (fish and birds) and represents a unique potential for eco-tourism, which has just started to be explored.

There is great potential for the development of ecological tourism activities in many of Romania's natural areas. Tourism can be developed to provide rural communities with additional sources of income while offering incentives to revive traditional practices that are sustainable or to create new ones. In no case can agrotourism be considered as a full solution to rural unemployment.

11.3 Strategic and legal framework

Policies and strategies

Agriculture is considered a strategic national priority in the National Medium-term Development Strategy of the year 2000. A key governmental objective is to ensure food security and rural development. It is foreseen that by 2020, 3 million ha will be used for modern farm techniques, 2.5 million ha for medium and 1.2 million ha for low-level technology, all of them helping to ensure the food supply on the domestic market and for exports. Taking into account the multiple ownership categories and the increase in plot sizes by the association of farmers, exchange and acquisition are to be encouraged to promote efficient agriculture, an efficient use of pesticides and fertilizers and to spur technical progress in agriculture by the proper training of farmers. More emphasis will be placed on privatizing the still State-owned agricultural companies. On the other hand, sensitive arable land (erosion, landslides) should be transformed into grassland or reafforested.

Romania is making an effort to harmonize agricultural and agro-environmental policies with the rest of the European Union: the National Plan for Agriculture and Rural Development drawn up by the Agency for Regional Development under the pre-accession EU programme SAPARD was presented by Romania in October 2000. The emphasis is on improving product processing, marketing and quality control, as well as veterinary and plant-health controls. Entrepreneurial behaviour and respect for the environment must be ensured. Youth will get special support, as will poor rural communities: measures will be taken to improve infrastructures, processing, vocational training and marketing, including of non-agricultural or traditional products, to help set up producing groups (200 with 5,000 farmers), to ensure agricultural production methods designed to protect the environment and maintain the countryside, and the diversification of activities, and to improve forestry. Non-reimbursable aid for the purchase of machines and equipment (12,600 pieces of equipment) can be granted, if 25% co-financing can be found.

In particular, 20% of the SAPARD funding will be allocated to rural communities with the emphasis on the fight against drought and aridity. By 2010, 65,000 ha of degraded and abandoned cropland will be afforested and 2000 km of protective shelter belts planted on agricultural land (10% of the SAPARD fund). It is estimated that up to US$ 25-30 billion phased over 15-25 years are necessary to restore land and eroded soil quality. The planting of forest belts on 20,000-30,000 ha and fighting erosion on 1.0 to 1.5 million ha are foreseen before the year 2004. For instance, in 2000 the MWEP studied the afforestation of 1,095 ha of degraded dunes levelled for agricultural use.

The National Strategy and Action Plan for Biodiversity Conservation and the Sustainable Use of its Components (1996) contains a first approach of strategies for grasslands and agricultural ecosystems. Concretely, Pro Delta, the Danube Delta Institute, the Biosphere Reserve Authority

and the World Wide Fund for Nature (WWF) have together undertaken the restoration of wetland areas unsuccessfully drained for agriculture (Ostrovul Cernova and Babina in the Delta, Braila). The National Strategy proposal for the arable ecosystems in the plains is to reshape the landscape with shelter belts and hedge rows, to reduce cropland in favour of grassland and woodland, to control the use of agrochemicals and stubble burning, to establish buffer zones around existing protected areas and new protected areas on agricultural land and to reintroduce extinct animal species. Forest plantations outside the forest area (in pasture and on agricultural area) are also subject to protection (Forest Code No. 93/1996, art. 6). As for the protection of grassland ecosystems, no information was available despite its recognized importance.

The National Strategy on Sustainable Development gives priorities to investments in infrastructure (irrigation), the development of green tourism, the creation of family farms of an "optimal size" (between 50 and 100 ha) and securing the food supply by developing agricultural production and relaunching industrial sectors related to agriculture such as farming machinery.

A number of specific projects are also being developed under the Danube partnership programme and the Convention on the Protection of the Black Sea against Pollution (Law No. 98/1992) aiming at reducing Danube and Black Sea pollution, including that from agricultural sources. The rehabilitation and management of wetlands as important nutrient sinks are also included ("The Green Corridor for the Danube") and pilot projects for organic farming will be supported. The selected projects must demonstrate their efficiency (low-cost solution) and technical feasibility (emission and nutrient load reduction), show an innovative approach or process and prove their financial viability.

The legal environmental framework applicable to agricultural activities

Romanian laws and regulations have to comply with (a) the international conventions signed by Romania and (b) European regulations. For air and water pollution three directives specifically related to waste-water treatment and to the protection of water against nitrate pollution from agriculture have to be transposed into national legislation. The approximation process supported by PHARE starts with waste, and has to be extended to water and air. The deadline is 2007. In particular all projects and farming systems have to be examined from the point of view of the relevant European regulations (technical standards of the EU body of law). A governmental decision for the approval of the Action Plan concerning the protection of waters against pollution caused by nitrates from agricultural sources, based on the Council Directive on Nitrates (91/676/EEC), was worked out in 2000 by the MWEP.

As for biodiversity conservation, the NEAP contains provisions in line with the main international conventions and agreements in this field. The coordination of the NEAP has been attributed by Governmental Decision No. 540/180 to an interministerial committee (see Chapter 1) where the Ministry of Agriculture, Food and Forests (MAFF) is represented. A number of projects have been identified in the field of major agricultural sources, of soil protection and of biodiversity conservation.

The *Water Law* (No. 107/1996) regulates works related to water use (such as irrigation, art. 48) or protection from the waters (such as forests, art. 31). As concerns soil protection, article 49 paragraph (a) of the Law on Environmental Protection specifies that farming system regulations must be issued to conserve and improve terrestrial ecosystems. Article 51 (paragraph c) forbids the burning of vegetation. A law on soil protection is being drafted so details about licensing and sanctions are not yet available. Cadastre Law No. 7/1996 contains provisions on the monitoring of the physical and chemical properties of soils.

According to the Law on Environmental Protection, some agricultural projects are subject to EIA and licensing procedures (art. 11), e.g. land improvement over 200 ha and irrigation systems over 20 ha, animal farms over 100 head of cattle, over 500 fattening pigs and over 6,000 places for poultry). The provisions relate to water use (art. 39, paragraph a) and soil use (art. 48, paragraph c).

Agriculture is subject to regulations on permits (Ministerial Order No. 125/1996), on alert thresholds for intervention (Ministerial Order No. 756/1997), on quality requirements for water discharge (Governmental Decision No. 70/1997), on norms for labelling equipment (Standard 13339) and Governmental Order No. 4/1995 on the approval of plant protection products together with decree No. 466/1979 regulating the production, storage etc. of toxic substances.

The use of agrochemicals is governed by Chapter II, section 3, of the Law on Environmental Protection, which deals specifically with chemical fertilizers and pesticides. In particular, their use is prohibited in areas where special protection measures are in force (art. 28 paragraph d). Romania is now nearing the EU Nitrate Directive.

Government Ordinance No. 4/95 provides the basis for the use, production and trading of agrochemicals. Ordinance No. 71/1999 provides the basis for plant protection (prevention and treatment of plant diseases) and phyto-sanitary quarantine at national level (with the upgrading of the central laboratory) and the service in each *judet* (by the agricultural directorate). A series of legal acts in line with EU directives was adopted to implement EU provisions on phyto-sanitary activities and pesticide residue control. Statutory rules for the authorization of plant production products lay down the procedure for their registration and a comprehensive list of those that are authorized. In addition, a health and an environmental agreement are required for the use of these products to promote lowest toxicity and medium persistence products. The use of DDT and technical HCH is forbidden by Governmental Order No. 20/1985.

An emergency ordinance based on EEC directives (2092/91) was issued on organic farming (No. 34/2000). NGOs active in this field (such as Bioterra and TER) in collaboration with the Ministry of Agriculture, Food and Forests carry out research and give practical instructions and try to gain the interest of farmers.

Ordinance No. 23/2000 has been drawn up for soil protection, where protection measures are to be applied to degraded (eroded, polluted) land and an inventory of reclamation perimeters established. Reclamation perimeters are defined in local plans. Within these perimeters land is earmarked for irrigation, drainage, flood protection, reafforestation and shelter belts, clearing and levelling changes to combat degradation (erosion, excess humidity, salinity, etc.). Correlated measures for the reconstruction of torrential watersheds are taken especially in hilly and mountainous areas. Those works are supported by a land reclamation fund set up by the Law for Land Fund (No. 18/91) (US$ 450,000 in 2000). All local owners have first to agree with the proposed measures. According to article 87, owners who perform land reclamation can be provided with free seeds and fertilizers for that purpose.

Monitoring of natural resources used in agriculture

Agricultural soils are monitored in 670 stations and forest soils in 269 stations. Quality monitoring (evaluation of damage) is carried out on three levels: (1) general identification of soil quality; (2) identification of soil pollution; (3) identification of rehabilitation solutions.

The National Integrated System of soil quality monitoring was set up in 1975 and harmonized with the European system in 1992. It was set up by the Institute of Pedology and Agrochemistry of the Academy of Agricultural Sciences. The monitoring system is based on a 16 x 16 km^2 grid. Land surveying, defined by Law No. 7/1996, includes surveying agricultural land and the organisation of farm land and is now carried out by both the Ministry of Agriculture (soil science and agrochemical studies) and the new National Office for Land Survey Geodesy and Cartography (inventory of properties), both on the national and on the local level (regional offices). The intention is to ensure that both activities are methodologically unified and uniform.

Institutions

The Ministry of Agriculture and Food is responsible for policies, strategies and legislation on agriculture at national level. As for the integration of ecological concerns into agricultural practices, both the MAFF and the MWEP participate in interministerial commissions with other ministries (in particular the Ministry of Health) dealing with issues of common concern, for instance the updating of the authorized pesticide list. Similar interministerial commissions exist for every specific topic. However, although this framework for cooperation does exist, relationships do not seem to be all that effective. Moreover, there are not enough specialists: there is only one person in the MWEP to deal with issues as broad as soil reclamation and biodiversity protection in agricultural areas, in particular, in pastures.

In each *judet* an "agricultural directorate" (*directia agricola*), depending on the MAFF, is responsible for the implementation of MAFF policies and strategies, such as the distribution of vouchers and agricultural statistics. It performs, inter alia, phyto-sanitary inspection and pedological studies.

The land reclamation authority (*Regie Autonome*), established by Ordinance No. 23/2000, is in charge

of both land reclamation and environmental protection for all Romanian agricultural soils. It manages soil quality to achieve efficient farming, less influenced by major weather and climate fluctuations (drought, flood, soil erosion). It is responsible for setting up reclamation perimeters.

The Research Institute for Agro-Chemistry and Soil Science has a database and a system for monitoring soil quality and the level of nutrients in the soil.

Training and information

In January 1999 agricultural extension was reorganized as a body independent of the local agricultural directorates, through a Phare project (RO 9505-01-01) and with the assistance of British and American experts (see AKIS system from the Kentucky extension exchange program). The new National Extension Agency (*Agentia Nationala de Consultanta Agricola* (ANCA)) has local extension services. Their task is to provide information to small farmers and to beginners, and in general to promote a better attitude to environment in the countryside. Moreover, some basic courses in agriculture are given in village schools.

Foreign support for the implementation of environmental objectives in agriculture

A few SAPARD measures aim to contribute to a better environment and sustainable development. Measure 3.3 addresses agricultural production methods designed to protect the environment and maintain the countryside and will support conversion to organic farming (45,000 ha), the protection of areas with special biodiversity/natural interest and the management of non-productive areas for the maintenance or the improvement of the rural landscape and natural environment. As a diversification of economic activity, rural tourism with handicraft activities is promoted by measure 3.4. Measure 3.5 addresses forestry: reforestation programmes will be carried out in collaboration with MWEP. The measure will benefit 215,000 farmers or forest owners. Some € 215 million (about US$ 198 million) are earmarked for afforestation. On the whole, in the frame of SAPARD, reclamation concerns 150,000 ha of drainage and erosion protection, 30,000 ha of irrigation, and 36,000 ha of afforested areas.

Besides Phare projects related to legislative approximation, the PHARE 98 projects related to local environmental action plans with demonstration projects and to environmental education (agricultural training in environment) are the most relevant to environmental friendly agriculture. Links to agricultural activities for small farms can be developed within the framework of those environmental projects.

The Danube Pollution Reduction Programme (1998) identifies four areas for environmental improvement in agriculture: better agricultural practices, better management of animal waste from large farms, better management of the forests and new management of the hydrological regime (hydrotechnical works) and of wetlands (reducing arable land). With a number of local projects, its aim is to reduce water eutrophication in 30% of the surface waters adjacent to farms by 2001 and to reduce nutrients in water by efficient agricultural practices in accordance with EU standards, thus increasing agricultural production by 10% by 2003, using the same amount of fertilizers. The project also plans to turn 3% of bad agricultural land in the Danube flood plain into wetlands by 2003.

An "agricultural pollution control project" supported by the GEF will affect 72,000 ha in the *Calarasi Judet* (where Danube water quality deteriorates from class 1 to class 2 and intends to:

- improve agricultural practices according to the suitability of the land (with demonstration projects) with environmental assessment,
- develop a village-level manure management storage and handling system with environmental and health assessment,
- fix sites and upgrade the monitoring of water and soil by the local EPI,
- prepare a land-use management plan (agricultural land, nature reserve and forest) together with a guideline for the application of the Code of Good Agricultural Practices and a system for monitoring the quality of irrigation and drainage water.

11.4 Conclusions and recommendations

Agricultural practices

Despite the existing legislation, new laws are needed to adjust to new developments in the agriculture sector, in particular the many and far-reaching consequences brought about by privatization and the resultant changes in ownership patterns. There is a lack of adequate and realistic agricultural policies based on a correct assessment of the existing situation. At present, agricultural

production requires specific laws, which should encourage agricultural activities and also contain coercive provisions (incentives and penalties) to prevent irrational farming practices. Staff is also insufficient to control and implement the legislation. Indeed, the legislation itself is continuously changing due to the ongoing transition and alignment to EU regulations, but in any case it cannot be applied because of a lack of resources.

The licensing system is well developed: environmental audit in three stages was developed for enterprises under privatization and new enterprises have to comply with the standards from the outset. However, in practical terms, the licensing system will be applicable only to large agricultural companies and associations. It is important that not only large animal farms but also large crop farms should be subject to the usual licensing, controls, eco-labelling, eco-audit, with legal liability and use of the best available techniques (BAT) in their agricultural practices for water protection (use of inputs) and land use (suitable machinery and soil-tilling practices, anti-erosion practices). Ultimately, only products from such farms will be able to be exported to western Europe. The same requirements for permits should apply to agricultural machinery service companies (*Agromecs*).

The implementation of organic farming practices has still to be achieved (strict control of "organic" and labelling) and economic incentives for organic farming do not exist. The appreciation of organic food by Romanian consumers is low. In fact, Romanian farmers practise organic farming due to a lack of funds for agrochemicals, but their products are sold on the local markets at a lower price than in stores. Great hope is put on external western European markets, but such markets are quite few.

At present, the extension and training system is inefficient, due to the lack of interest among new agricultural owners who are old and young people who do not necessarily see their future in the countryside, especially where the production potential is low. Consulting services for farmers are considered insufficient and professional certification for farmers is needed. At all levels, agricultural training has a very small place in Romania's educational system, far too small considering the importance of agriculture in its economy. NGOs, mainly involved in environmental education, are very limited in the rural areas and rely predominantly on external funding.

Recommendation 11.1:
The adverse environmental effects of agricultural practices should be reduced to a two-tier approach:

(a) Larger farms and companies that invest in inputs and produce for the market should keep a record of the application of fertilizers and the use of pesticides on their land. These records can be controlled by inspectors from the local EPIs. The practice could be introduced by law following the model already applied in those areas of the Danube Delta Nature Reserve (Sireasa and Padurina) that are still farmed.

(b) The agricultural extension service (Consultanta agricola) should promote on a large scale correct organic farming practices.

Soils in Romania are in general fertile and naturally give good crop yields. Of course yields can be improved with irrigation or inputs. However, considering the current lack of money to finance inputs and mechanical equipment and to rehabilitate irrigation fields, as well as the complete absence of stable markets and marketing channels to sell the products, it would be advisable first to train the farmers to develop rationally optimum and environmentally safe agricultural practices with what they have; then, in a second stage and at an affordable pace for the farmers, when market networks are developed, to steadily plan a modernization of agriculture with the introduction of loans and credits for buying inputs and equipment, and put in place ambitious land improvement plans.

Recommendation 11.2:
The agricultural extension service should demonstrate various technical options (with or without irrigation, seed quality, use of inputs and soil tillage), their effect on the environment (water pollution, soil conservation) and the expected yield and profitability, in order to be able to advise farmers in different regions of the country. They should train subsistence farmers who cannot afford inputs to allow them to increase the profitability of their farms and sell their products better. These farmers should be encouraged not to use costly agrochemicals.

Zootechnical units have been listed as a major source of water, soil and air pollution alongside pollution from industry and from the municipal waste waters of larger cities. In particular, pollution and accidental spills from large pig farms (2% of the waste) should be prevented with appropriate

equipment, and also by strengthening respect for legislation and discipline.

Due to the economic development and structural changes in Romania many pig farms have closed in the past few years. This trend will probably continue. It would therefore be appropriate to submit pig and poultry farms to a late stage of IPPC integrated licensing and to coordinate this effort with the implementation of the Nitrate Directive. Also, no increase in pig meat production capacity should be authorized without taking account of Romania's international commitment to air pollution abatement.

A number of handling techniques for manure are either used or tested in western Europe. However, similar large pig farms in eastern Germany are now being closed or drastically reduced in size, because the German Minister of Agriculture considers that the proper disposal of the slurry from such large units simply cannot be mastered from the environmental point of view. Measures such as splitting the large units into smaller ones should be envisaged. This would both reduce pollution on the fields (as the areas for spreading would be wider) and ensure better efficiency at the waste-water treatment plants. As in any other problematic industry, the water and the slurry of large animal farms (pig farms) should be monitored with an increased frequency, including for heavy metals in pig feed (Cu, Zn, Cd) in order to prevent accidental pollution.

As manure is a precious fertilizer for subsistence farmers, it is the task of the extension service to promote the correct storage and use of their own manure as well as that "imported" from large pig farms.

Recommendation 11.3:
To ensure the protection of water bodies, large animal farms should deposit the slurry on agricultural land according to good agricultural practice. The slurry spreading and manure distribution should be monitored through contracts and records maintained with large crop farms, which are probably the most suitable to ensure the correct disposal of large quantities of manure. The disposal of animal dung in landfills should not be authorized.

Soil protection

Although desertification and drought control is a problem for the State to tackle, erosion is a problem which must also be tackled by individual owners and their responsibility must figure in the new land code. The overall objective is to protect and conserve agricultural ecosystems by applying technologies that provide sustainable agriculture and boost agricultural production. This is possible in larger entities and farmers' associations should be encouraged.

In soil protection, problems should be identified and prioritized. An expert system should be developed describing the maximum use of the natural productive capacity of farmland by type of soil – taking into account its specificity and environmental requirements, without permanently damaging its quality or the environment. Agricultural-environmental indicators should be introduced to identify the types of crops and technologies that may endanger the different types of soils. Furthermore, alternative solutions to agricultural use have to be prepared in contrast to past policy, at least for highly degraded land (2 million ha) and its rehabilitation adapted to available financial resources.

It would be good if the status of the soil were to be controlled on the farms. To this end, local EPIs (the protectors' side) should build up their capacity to control soil erosion and soil compaction (and not only soil contamination). The competence of the local EPIs should then also include control of biodiversity outside the protected areas.

Recommendation 11.4:
The Ministry of Agriculture, Food and Forests together with the Ministry of Waters and Environmental Protection should list and precisely map at a national level (regional and local data are available) all agricultural soils severely contaminated by heavy metals, oil or pesticides in order to exclude agricultural products produced in those soils from any certification and export. In the long term, such products should also be excluded first from local markets and finally from consumption.

Reafforestation has been undertaken in Romania for about 40 years. The Law on the Reclamation of Degraded Lands by Afforestation (No. 107/1999) has been issued recently. The Forest Code (No. 93/1996) protects reafforested agricultural degraded land (art. 3). Clearing trees on pasture is submitted to study and authorization from the MWEP (art. 88). In this period of economic difficulty, the MWEP faces an increasing number of demands for authorization to fell trees.

Recommendation 11.5:
The appropriate institutions of the Ministry of Waters and Environmental Protection should assess the environmental impact of all large afforestation projects and other "rehabilitation" projects (see "Green Corridor for the Danube"), and in particular their influence on the biodiversity of the site. Moreover, their influence on the economic and social status of the local land users involved (private or local communities) should be studied and other alternatives, even for abandoned land, evaluated (on the model of the study on Peris).

Water

Compared to 1989, river water quality has improved, as a result of decreased agricultural activity (sharp decline in cattle and pig herds) leading to a decrease in nitrogen, phosphorus and pesticide emissions. The use of inputs decreased considerably after transition, because individual farmers could not afford them (see Figure 11.3). The reduction in diffuse N and P pollution is estimated at 30-40%. Since 1997 Romania's overall nitrogen balance has been negative, suggesting a net withdrawal from the soil. However, the new system of agrochemicals provided on credit and paid back at harvest could increase their use and lead to more pollution.

At the same time, there has been a slight reduction in the concentrations present in groundwater due also to the decrease in the quantities of chemical and organic fertilizers used in agriculture. It is estimated, however, that the quality of the groundwater is not really improving because there is insufficient protection from the occasional outflows of polluted and waste waters (for instance, from animal breeding in Carei, Hlaciu, Bailesti, Beregsau) and the persistent effects of past and present incorrect use of chemicals fertilizers in Tg. Mures, Arad, Craiova, Rm. Vilcea and Roznov.

Recommendation 11.6:
The draft law on cultivated plants and pesticides should include the obligation to obtain a treatment permit subject to a course and an exam for all companies and private individuals using large quantities of pesticides, such as large crop farms and agricultural machinery services ("Agromec"). All entities should be made liable for the pollution caused by their practices.

Biodiversity

As for agro-biodiversity, the number and the state of the various species of cultivated plants or breeds of domestic animals in the country seems to be unknown, at least at the MWEP. The draft law on protected areas does not concern habitats outside the protected areas. The network of protected areas does not include all types of ecosystems, in particular it excludes those in the hills and mountains. In the agricultural areas, there are no management plans for grassland and steppe ecosystems that contain important species in need of protection.

Recommendation 11.7:
The Ministry of Agriculture, Food and Forests and the Ministry of Waters and Environmental Protection should cooperate to regulate the use of grasslands (especially on the steep hills) and protect them from inappropriate cultivation and overgrazing.

Cultivated crops, traditional harvesting and grazing practices in Romania still support a sizeable rural population which lives within the limits of the available biological resources, especially in the less productive areas (mountains). However, despite the net return of people to rural areas since transition, traditional farming is practised by an ageing population. There has been no joint discussion of a strategy for the conservation of biodiversity in agricultural land between the MAFF and MWEP although the rebuilding of biological diversity is integrated in the SAPARD projects together with action against erosion (forest shelter belts in Dobrudja and four other regions). Small-scale agriculture represents a source of food for the rural population and often supplies produce to urban markets. Special programmes for these farmers should be developed to train them to better protect, improve and use their land.

Chapter 12

ENVIRONMENT AND TRANSPORT

12.1 The transport system

All modes of transport are used in Romania -- rail, road, water and air -- though their development trends have been strongly influenced by the economic transition since the early 1990s.

The railways have traditionally provided the main form of transport for both freight and passengers in Romania. The number of passengers and the volume of freight carried by the railways have, however, declined substantially over the past decade.

The public road network is divided into national roads and county and municipal roads. Most of the national roads, which represent 20% of the total road network, are up to modern standards.

Romania's principal ports are Constanta, on the Black Sea, and Galati and Braila, neighbouring cities on the lower Danube. The Danube River is a major transport route, supplemented since 1984 by the Danube-Black Sea Canal from Cernavoda to Constanta.

Romania has two major airlines, TAROM, which is owned by the State, and LAR, which was established as an independent airline in 1990. International airports are located in Bucharest, Constanta, Timisoara, and Arad. As a result of the structural changes caused by the transition to a market economy, the volume of transport by air declined dramatically during the 1990s.

Trends in passenger transport

Since the early 1990s, there has been a tremendous increase in the number of passenger cars. In 1990, there were about 1.3 million passenger cars in Romania. Eight years later, the number had more than doubled to 2.8 million (Figure 12.1) and the number of motor vehicles per 1,000 inhabitants had increased from 93 in 1990 to 164 in 1997.

Public transport development has been completely the opposite. Between 1990 and 1999 the volume of intercity public transport (measured in passenger-kilometres) dropped by more than 50% (Figure 12.2). The number of people using urban public transport also decreased dramatically during this period, by about 40% (Figure 12.3). The number of towns with urban passenger transport systems also decreased, from 169 in 1993 to 142 in 1998.

Trends in freight transport

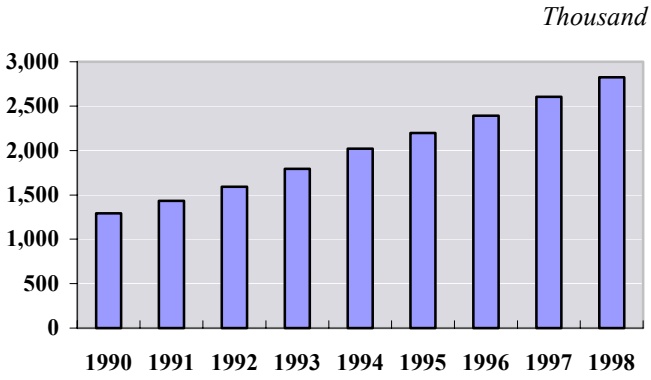
The amount of freight transported by rail started to decline some 20 years ago. As a result, road transport has taken on a larger share of freight transport. In the early 1990s, transport volumes on both roads and railways decreased some 50% in a few years. After 1993 road transport started to increase again, while the railways continued to decline. In 1997, the railways and the roads carried almost the same volumes (measured in ton/km) (Figure 12.4).

Development of the infrastructure

Investments in road construction amounted to 1,138 billion lei (about US$ 46 million) in 1995-2000 (see Table 12.1). In general, investments made were slightly lower than the amounts forecast. Since 1998, all investments have been financed from the special National Fund for Roads. Before 2001 money in the Fund came from an annual tax on road vehicles. Since 2001, this tax has been included in the tax on fuel.

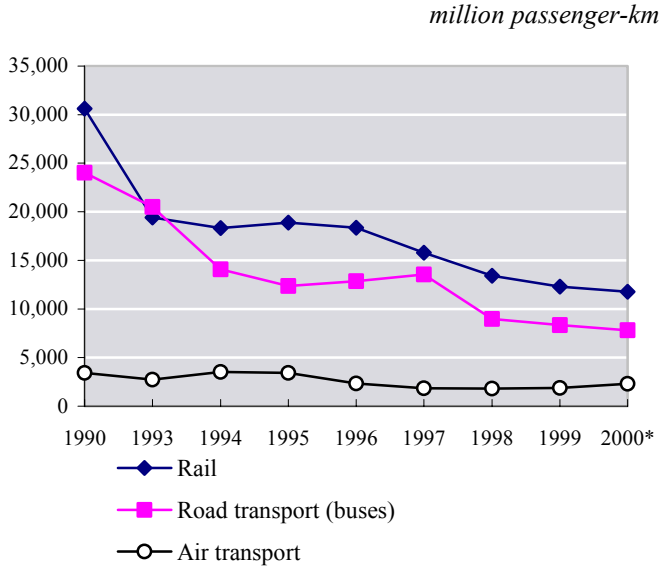
Investments in railway infrastructure amounted to 534 billion lei (2000 value) over the same period (1995-2000). These investments were far lower than planned (13,900 billion lei, 2000 value), with a drastic reduction in 1998-1999. In 2000, investments picked up with the injection of EU funds.

Figure 12.1: Number of passenger cars, 1990-1998



Source: Romanian Statistical Yearbook, 1999.

Figure 12.2: Use of public transport, intercity and international, by mode, 1990-2000*



Source: Romanian Statistical Yearbook, 1999.

* Estimated data.

12.2 Impact of transport on health and the environment

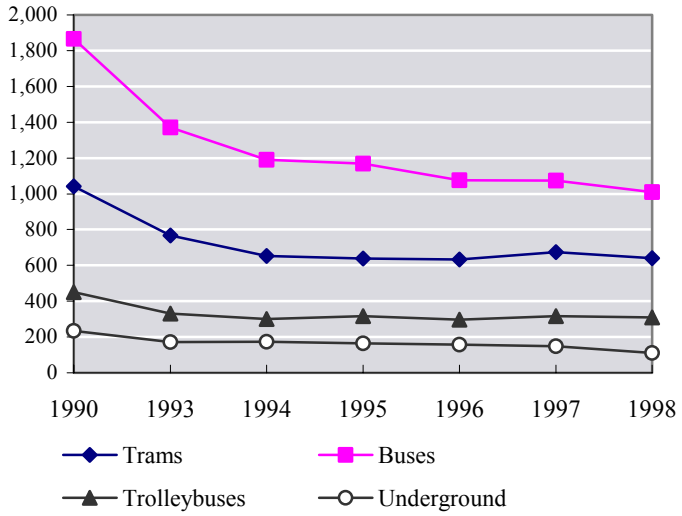
Emissions to air

In 1997, the transport sector contributed 50% of the total emissions of NO_x. For other pollutants like NMVOC and CO the contribution was still significant, but lower, under 20%. Six per cent of total emissions of CO_2 were attributed to the transport sector. (Table 6.1 and Figure 12.5). Data on NMVOC are controversial. While data from the National Research Development Institute for Environmental Protection (ICIM) indicate that 14% of NMVOC emissions could be attributed to road vehicles (CORINAIR data in Table 6.1), the Romanian Auto Registry's figures are much higher.

Total emissions of lead have slightly decreased over the years (Table 6.1), while the number of motor vehicles increased by more than 75% between 1990 and 1997. This means that, in relative terms, lead emissions have slightly decreased, a trend that has also been recorded in the Bucharest area by the Ministry of Health's monitoring network. The step-by-step introduction of unleaded petrol and the gradual replacement of some of the old cars by more modern vehicles might have contributed to this trend.

Figure 12.3: Use of urban public transport, 1990-1998

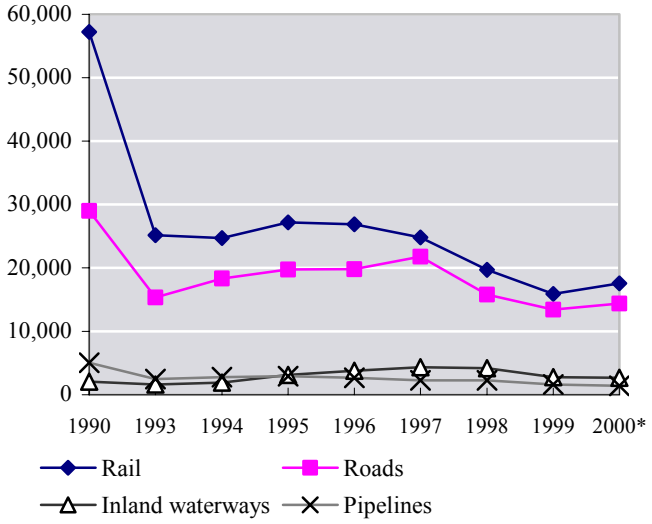
million passengers



Source: Romanian Statistical Yearbook, 1999.

Figure 12.4: Freight transport, 1990-2000*

million tons-km

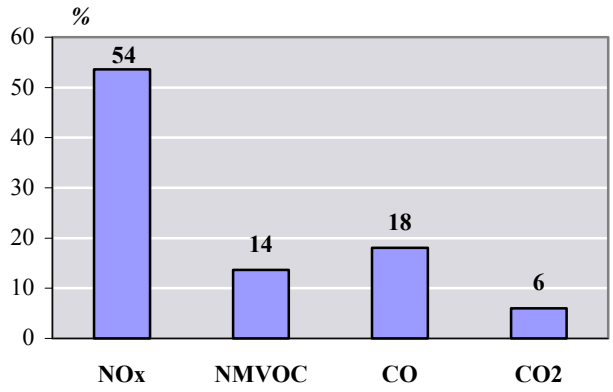


Source: Romanian Statistical Yearbook, 1999.

* Estimated data.

Future emission scenarios for CO2 from the transport sector have been produced in the national report to the secretariat of the United Nations Framework Convention on Climate Change. According to the reference scenario, CO2 emissions from transport will increase by about 50% between 1995 and 2010. The reference scenario implies no structural changes in the economy, a low reduction in energy intensity and no implementation of new measures. In two alternative scenarios, with a different degree of structural change in the economy and the implementation of energy-efficiency measures, the growth of CO_2 emissions would be just over 20%.

Figure 12.5: Contribution from the transport sector to total air emissions, 1997



Source: The National Research Development Institute for Environmental Protection (ICIM), Romania.

Local effects of air pollution from road transport

Ambient air quality exceeds maximum admissible concentrations (MAC) for many air pollutants like NO_2, SO_2, CO, PM and lead, quite frequently in many Romanian cities and industrial areas (See Chapter 6 and 14). The air pollution in urban areas is mainly due to industrial activities and traffic. In general SO_2 concentration is low in all cities whose local power plants do not use high-sulphur oil (an exception: Constanta), but NO_2 and PM are both high, indicating pollution by motor vehicles. In Bucharest it is estimated that road transport contributes 50% of monitored NO_2 concentrations (Table 14.2).

It is very difficult to know what share of the lead content of the ambient air is due to vehicle emissions. Lead is monitored in a number of cities. However, there are also many lead-emitting industries in Romanian cities. Consequently, it is not possible to have a clear idea of the quantities due to the transport sector. But high levels of exposure have been recorded in many highly polluted cities. (See more details in Chapter 14).

Noise

There are no nationwide data available on the number of people affected by noise from roads, railways and airports. However, urban noise (from all kinds of sources) is monitored every second year by the Public Health Institute in Bucharest in cooperation with specialized local departments. The latest survey, of 1999, shows that noise levels continue to increase in almost all cities. Noise limits are exceeded by more than 20 dB(A) not only in the main streets but also in residential areas in the noisiest cities (Bucharest, Brasov and Braila). The noise levels range between 60 and 70 dB(A) in residential areas. Epidemiological studies carried out as part of the survey show that 45% of the population is annoyed or severely annoyed by noise. The main sources of high noise levels are traffic, industrial sites and "inadequate behaviour by neighbours".

It is expected that noise levels will come down in the future, as a series of EU directives on this matter should be transposed (Chapter 1, Figure 1.1) and implemented.

Impact of new transport infrastructure on the landscape

The impact of new transport infrastructure on the landscape is of course dependent on the location and design of the individual project. However, the probability of conflicts and damage to the landscape and ecosystems increases with the number of new projects. Between 1993 and 1998 the density of public roads per 100 km^2 of land increased very slowly, from 30.5 to 30.7, showing that no large projects had been achieved during that period. This situation might change as accession to the EU implies the development of the backbone transport network of the pan-European region.

12.3 Objectives relevant to the transport sector

Environmental strategy for the transport sector

There is no strategy for the transport sector for the time being, although a draft, produced at the request of the EU, is circulating in the Ministry of Public Works, Transport and Housing. In early 2001, the negotiations with the EU on the transport sector had not yet been opened. Whether the strategy will include provisions or a separate chapter on the environment is not known as the MWEP has not yet been associated with its development.

However, the National Strategy for Sustainable Development, carried out by a working group established by Governmental Decision (No. 305/15.04.1999), contains policy objectives for the transport sector. The main objective is to restructure the national transport system and ensure its proper functioning, with a view to creating a homogeneous transport system connected to the pan-European road network, which should also connect more isolated areas. This restructuring should lead to high-quality domestic and international transport services.

This objective is supplemented by a number of guiding principles:

- On the domestic market, regulations are meant to bring the level of pollution to EU standards;
- The creation of a pan-European network and its connection to the TRACECA corridor (Transport Corridor Europe-Caucasus-Asia); this network will be consistent with the multi-modal transport network initiated by the EU under the TINA process (Transport Infrastructure Needs Assessment, Decision No. 1692/96/EC);
- Guaranteeing traffic safety and the safety of passengers and goods;
- Environmental protection and conservation;
- Accessibility and affordability of the public transport system;
- Institutional reorganization and reform.

The principle for "Environmental protection and conservation" has been drawn up on the basis that a sustainable transport policy must be achieved by using ecological means of transport. It will be necessary to rely on end-of-pipe technologies and preventive measures to diminish the effects of pollution (for example, inspecting the technical condition of road vehicles), and to license entrepreneurs intending to offer transport-related services and activities. Financial mechanisms with the aim of encouraging the use of less polluting means of transport that use less fuel will also be promoted.

Furthermore, regarding the different types of transport, the following special considerations have been made:

- General: The extended use of combined and inter-modal transport using special rolling stock with a low level of consumption and pollution, the introduction of centralized management for the transport of goods (inter-modal platforms) and improving the sale of train tickets at regional and national level. Air transport uses a system (the BSP Romania system) that facilitates the sale of tickets throughout the country for all airlines operating in Romania.
- Road transport: Since 1998, EURO II norms have been applied to imported vehicles. Since 1 January 2000 the same norms have been applied to vehicles produced in Romania.
- Railway transport: The use of electric engines for trains, the use of modern rolling stock that will allow an increase in speed, the use of modular units for goods trains, an increased use of electric and diesel trains for passenger transport, the introduction of modern loading and unloading technologies.
- Water transport: Replacing traditional vessels with modern ones; modernizing loading and unloading systems.
- Air transport: The old, poorly performing aircraft are gradually being replaced by modern ones. TAROM now owns eight Boeing 737-300 planes, six ATR 42-500, and two Airbus 310; in the future Romania is to buy more Boeing 737-700 aircraft and replace Airbus 310s with Airbus 330s.

This transport sector strategy will be applied by combining actions at governmental level with actions at regional and local level.

The National Environmental Action Plan (1999-2000) will implement the strategic objectives for transport expressed in the sustainable development strategy.

Strategies, forecasts and measures determining the dimension, the direction and the priorities of the development in Romania, in particular concerning transport infrastructures, are formulated in section 1 of the Spatial Plan for Territorial Management (PATN). It covers existing and future infrastructures of national importance, i.e. all motorways, express railroads, canal and river transport and airports were approved in 1996 (Law No. 71/96). It points to the need for investments in the transport infrastructure; for example it includes three major trans-European transport routes that are necessary in view of accession to the EU. Other sections of the PATN, like the one on nature conservation (section 3), provide for restricting activities that can have an adverse impact on nature and biodiversity, including the development of the transport system.

International agreements

Romania has signed a number of international environmental conventions, which may imply actions within the transport sector. One example is the Protocol to the Convention on Long-range Transboundary Air Pollution adopted in Gothenburg, Sweden, in December 1999. Romania has signed it. In accordance with the Protocol, Romania should by 2010 reduce its emissions of SO_2 by 30%, NO_x by 20%, NH_3 by 30%, and VOC by 15% as against 1990 levels. Under the United Nations Framework Convention on Climate Change and the Kyoto Protocol, Romania is committed to reducing greenhouse-gas emissions by 8% in the period 2008-2012, compared to the reference year (1989). However, the most important agreement is the agreement for Romania's association to the European Union, and the pressure that that puts on the transport sector, for example.

12.4 Policy instruments in place and planned

Institutional arrangements

In early 2001, the former Ministry of Transport was merged with the former Ministry of Public Works and Land Planning. The Ministry of Public Works, Transport and Housing (MPWTH) with its State Secretary for Transport is now responsible for the development of policy and legislation on transport-related emissions to air. It has issued legislation transposing the directives on vehicle emission and the roadworthiness of vehicles. It records data on emissions to air from vehicles.

The Romanian Auto Registry (Registrul Auto Român) is responsible for inspecting road vehicles. It reports to the MPWTH. It certifies and monitors garages and inspectors carrying out roadworthiness inspections of vehicles, issues car type-approvals and conducts technical inspections for registration. It provides technical support to the MPWTH and is consulted when policy and legislation are developed.

The national road and railway authorities are also under the MPWTH. The National Road Authority supervises the construction and the maintenance of roads and highways of national importance. The National Railway Authority does the same for the railways. There are inter-ministerial committees for road transport and for railway transport with their respective ad-hoc sub-groups dealing with legislative and regulatory projects; the MWEP participates in these groups.

The Ministry of Industry and Mineral Resources is responsible for fuel-quality policy and legislation. The Ministry has introduced taxes on the sulphur content of fuel oil (Governmental Decision No. 1336/2000) and the lead content of petrol (Governmental Decision No. 489/1998).

For all matters concerning coordination with the NEAP, however, the link with the Ministry of Waters and Environmental Protection is ensured through the Inter-ministerial Committee for the Promotion and Follow-up of the NEAP, of which the Ministry of Transport is a member.

Emission requirements for road vehicles

The emission requirements for road vehicles are based on those of the European Union. The EU directives are implemented step by step according to the national strategy for preparing the country for membership of the European Union.

The period of time allotted to vehicles for complying with standards varies. Since 1 July 1998 all vehicles imported in Romania, both new and used, have had to comply with "EURO II" standards for registration in the Romanian Auto Register. As a result the average age of imported vehicles has decreased from 8½ years to 4½. Vehicles produced in Romania have had to comply with "EURO II" standards since 1 January 2000 for registration. A tightening of the national requirements is planned. As from 1 January 2002, imported vehicles will have to comply with "EURO III" standards. Vehicles produced in

Romania will have to meet these standards as from 1 January 2005.

To use the public roads, all vehicles, including tractors, need to have the approval from the Romanian Auto Registry. Vehicles in use are tested in two ways:

- On a periodic basis (every six months for buses, every year for heavy goods vehicles and every two years for other road vehicles). The periodic testing is carried out by certified inspectors and garages according to the provision of EU Council Directive No. 96/96/EC on the approximation of the laws of the Member States relating to roadworthiness tests for motor vehicles and their trailers. During these tests, 77% have been found to be in compliance with the emission standards. There are approximately 400 garages certified by the Registry to carry out such tests. They are all equipped to comply with Directive No. 96/96/EC. The charge for the test is not regulated, the average is about 200,000 lei.
- In addition to the regular checks, the Police and the Registry carry out spot checks on vehicle safety and emissions. In these tests 41% (1999) of vehicles were found to be in compliance with the emission standards (38% failed because of pollutant emissions, 21% because of leaking exhaust pipes).

If vehicles do not comply with regular roadworthiness tests, the required certificate is not issued and the owner has 30 days to remedy the problem. Driving without a certificate is an offence subject to a fine (between 200,000-400,000 lei).

Bucharest's public transport company (RATB) is voluntarily investing in more environmentally friendly buses. Currently 19% of the buses comply with EURO I standards and 24% with EURO II. Within the next eight years (2001-2008) RATB will purchase 100 new buses per year in order to replace all buses without exhaust emission control. In a pilot project RATB was also to introduce buses running on LPG in November 2000.

Environmental requirements for petrol and diesel

Romania is aiming to transpose EU fuel standards into Romanian law. There is a strategy to phase-out lead in petrol, in line with EU Directive No. 98/70/EC. According to current plans, leaded petrol should be totally phased out by 2005 (see Chapter 6). In 1997, 83% of the petrol sold in Romania was still leaded. One reason is that the vehicle stock is old and supposed to need leaded petrol. Another reason is the inadequate economic incentive for unleaded petrol. The price at the pump is 12,600 lei for leaded and 12,400 lei for unleaded (October 2000). Furthermore, the Romanian petrol standard allows a much higher sulphur content than the EU standards. The Romanian standard in force since 2000 still allows six times more sulphur in petrol than the EU standard applied since the same year.

Taxation and charges on road vehicles

A special fund has been created for the construction and maintenance of national, local and county roads. Its sources of income are:

- 25% of the petrol and diesel oil retail prices
- 10% of the retail price of passenger cars
- 10% of the customs value of imported cars
- 5% of tractor and agricultural machinery retail prices

In addition, the fund also receives a special tax on the engine capacity of private vehicles and lorries, tractors, agricultural machinery and waterway transport vehicles, ranging from US$ 2 to 7 per year. As of 2001 this tax has been incorporated in the price of petrol and diesel oil. The fund has been the only source of new road investments since 1998 (see Table 12.1)

Environmental requirements for transport infrastructure

The use of existing and the building of new transport infrastructure is regulated in the Law on Environmental Protection (Law No. 137/1995), section 1 on transport infrastructures of the Spatial Plan for Territorial Management (PATN) approved as Law No. 71/96, and Ministerial Order No. 125/1996. The planning of new infrastructure takes place in a number of territorial plans on different geographical and administrative levels. The implementation of the plans is determined by the availability of grants in the national budget and international funding.

Table 12.1: Investments in the road and railways infrastructures, 1995-2000

thousand US$

	1995	1996	1997	1998	1999	2000
Roads	46,182	39,118	20,408	25,626	18,217	12,487
Railways	39,513	33,453	18,117	4,575	3,999	5,615
Inflation rate	*32.3*	*38.8*	*154.8*	*59.1*	*45.9*	*45.6*

Sources: National Authority for Roads; National Authority for Railways.

The *construction* of new transport infrastructure requires an environmental agreement (see Chapter 1). The competence to issue environmental agreements is divided between the Ministry of Waters and Environmental Protection and the local EPIs. The MWEP issues environmental agreements for bigger infrastructure projects like highways, parking areas with more than 1,000 lots, new railway lines, maritime harbours, international airports, and roads within protected areas. Applications for environmental agreements are subject to an environmental impact assessment. However, this EIA is made on finalized projects (sections of new roads) before the works are undertaken. There is no strategic assessment of the overall environmental impact of a planned infrastructure, to take into account its effect on the future development of protected areas and corridors for instance. While the creation of the network of protected areas is among the priorities of the most recent strategies and are important targets on the road to EU membership (EMERALD and NATURA 2000 projects), no map of the future Romanian network of protected areas is yet available to guide the decision-making process for transport infrastructure trajectories.

The *use* of the infrastructure is allowed only with an environmental permit (Autorititatsie). Environmental permits for transport activities are always issued by the local EPI. An environmental permit is valid for a maximum of five years. After that period a new permit is needed. The continuation of existing activities, specified in annex II to the law, also requires an environmental permit.

Urgent Ordinance No. 29/1997 adds some paragraphs covering environmental protection to the Code on Air Transport. These amendments provide that the Ministry of Public Works, Transport and Housing has to issue special regulations to establish a monitoring system for the environmental impact of airports. This system should in particular monitor the noise produced at landing and take-off. The regulations will follow international practice and be drafted in cooperation with the Ministry of Waters and Environmental Protection.

12.5 Conclusions and recommendations

A reporting system that monitors the environmental performance of the transport system is an essential element of a strategy for sustainable transport. An adequate system may help to raise awareness about the environmental impact of transport among individuals, companies and authorities. When more precise targets are established (see Recommendation 12.2), the reporting system should also be used to monitor progress towards these targets and, consequently, towards a sustainable transport system.

At present, the environmental performance of the Romanian transport system is reported piecemeal. A comprehensive reporting system covering the important parameters could facilitate the integration of environmental concerns into transport policy. As an EU applicant country it seems natural to use the Transport Environment Reporting Mechanism (TERM) as a framework. TERM was developed by the European Environment Agency in cooperation with the European Commission (DG Transport, DG Environment and EUROSTAT).

TERM is an indicator-based reporting system for the EU. The indicators were developed to answer seven questions which policy makers in the EU regard as the key to understanding whether current policies and policy instruments are steering the transport system in a sustainable direction. The first TERM report – TERM 2000 - was issued in May 2000. EEA is currently working on the TERM 2001 report, which will not only cover the current 15 Members States but also make an

attempt to report data from the applicant countries, including Romania.

Recommendation 12.1:
The Ministry of Waters and Environmental Protection together with the Ministry of Public Works, Transport and Housing should introduce a reporting system to monitor the environmental performance of the transport system, using the Transport Environment Reporting Mechanism (TERM) as a framework.

The formulation of more specific targets for sustainable transport could start with the development of a long-term vision of a transport system that is sustainable for environment and health while providing the benefits of mobility and access. Fixing objectives and targets is a way to provide even more concrete guidance to all those in society who have to contribute to the development of a sustainable transport system.

Environmental objectives can vary. Environmental quality objectives express a desirable state of the environment and will normally be long-term. Environmental quality objectives can be the basis of more operative targets. Such targets could lay down a desired change, e.g. a reduction of a load or concentration of pollutants, which can in turn be translated into concrete local emission reduction objectives. One example where such a methodology was used was in the preparation of the EU Directive on National Emission Ceilings. A target should normally also specify a deadline.

Sector-specific targets could allocate the responsibility even further. Appropriately expressed they could enable the players in the sector to pull in the same direction. The sector-specific targets could be both long-term and intermediate. The long-term targets should express environmental sustainability. For the operative work, intermediate targets are needed to indicate suitable steps towards the long-term objectives. The intermediate targets should form a basis for the planning and implementation of measures. Follow-up and new findings may lead to a modification of objectives and targets. The development of sector-specific targets should be made jointly by the Ministry of Transport and the Ministry of Waters and Environmental Protection.

Recommendation 12.2:
Specific environmental targets for the transport sector should be set jointly by the Ministry of Public Works, Transport and Housing and the Ministry of Waters and Environmental Protection. The National Road Administration should strictly follow the emission targets set for the transport sector.

Romania has an ambitious strategy for the implementation of the EU Directives on road vehicle emission requirements. Over the next years vehicles with advanced exhaust-emission control will be introduced on the market. To safeguard the functioning of the emission control system of these vehicles it is paramount to secure a sufficient supply of unleaded petrol and ensure that this petrol is not contaminated by leaded fuel. Otherwise there is the risk that future and past investments in new vehicles will be in vain. A total phase-out of lead is of course also needed in order to eliminate lead emissions. This total phase-out was expected for 2005, an objective that would be difficult to reach given the slow progress that has been made so far in introducing unleaded petrol. To date less than 20% of petrol sold is unleaded.

Necessary investments should be made in refineries and the economic incentives for the consumers increased, i.e. the price difference between leaded and unleaded petrol should increase. Furthermore, in order to ensure the correct functioning of vehicles' exhaust-emission control the fuel quality in general should be improved. For example, the sulphur content should be reduced. Governmental Decision No. 1336/2000 laid down precise targets and deadlines: decrease the sulphur content in petrol to 0.2% during the period 2001-2005 and to 0.05% after 2005.

Recommendation 12.3:
The Ministry of Industry and Mineral Resources should (1) accelerate the total phase-out of lead in petrol, in particular making the tax difference more attractive; (2) improve the quality of all fuels, in particular reducing their sulphur content; and (3) effectively enforce the implementation of Governmental Decision No. 1336/2000 on sulphur content in fuels.

A wide range of international studies shows that a sustainable transport system cannot be achieved with new technology alone. It requires a package of measures. New vehicle and fuel technology needs to be combined with an efficient use of the entire transport system, an attractive public transport system, traffic demand management and the encouragement of walking and cycling.

In comparison with many countries in western Europe, Romania has a favourable modal split. For example, a large number of passengers are still using public transport, even if the proportion has decreased dramatically during the past decades. Strong efforts should be made to improve public transport in order to encourage people to keep using it. An efficient public transport system is also beneficial from an economic and social point of view, as it can provide an alternative to the private car. Overall, it should be borne in mind that public transport per se is environmentally friendly. However, in Romania there is an obvious need for an improvement in the environmental performance of the buses in order to achieve benefits for ambient air quality. The renewal of the bus fleet in Bucharest has already produced positive results. Trams and trolleybuses may also provide an attractive alternative.

Recommendation 12.4:
The Ministry of Public Works, Transport and Housing and the local authorities should promote public transport through attractive pricing, the introduction of disincentives for the use of cars and public awareness campaigns.

At present, environmental assessments of new transport infrastructure take place only at individual project level. No environmental assessments are carried out at a more strategic level, e.g. when developing the transport chapter of the National Plan for Territorial Planning. An important requirement of the EU in nature protection is the development of a network of protected areas and corridors that are not even mapped out in Romania today. The forthcoming stage of negotiations with the EU on the transport sector will raise the question of choosing possible routing for the transport infrastructures. For the time being there is no instrument in Romania allowing an early calculation of a project's impact on the present and future environmental objectives. To integrate environmental concerns earlier in the decision-making process it is recommended that the next review of the transport chapter of the national Plan for Territorial Planning should be accompanied by a strategic environmental assessment (SEA).

SEA provides a means to assess whether a policy, plan or programme will contribute to, or counteract, environmentally sustainable development. In order to give an SEA a meaningful role it should take place early in the decision-making process and, if necessary, be capable of changing the policy, plan or programme. A major role for an SEA is to show how different strategic choices influence the means to attain environmental goals. The European Commission, DG Energy and Transport, has produced a manual on SEA of transport infrastructure Plans in the form of a user-friendly guide offering practical recommendations.

Recommendation 12.5:
The Ministry of Public Works, Transport and Housing should apply strategic environmental assessment (SEA) to the next review of the transport chapter of the National Plan for Territorial Planning.

The establishment of environmental units at the national transport authorities, e.g. the National Road Authority, should be encouraged. In other countries, these units have proved good ambassadors for the integration of environmental concerns into sector policy and activities. It is important to provide these units with sufficient resources. On the other hand, the coordination of transport action between the Ministry of Waters and Environmental Protection and the Ministry of Public Works, Transport and Housing is ensured through inter-ministerial ad hoc groups where the MWEP is represented in each group by different staff members. This gives the MWEP a fragmented view of the strategies and objectives of the transport sector since there is no focal person with a global vision of what is being done in the transport sector. Therefore, there seems to be little chance of influencing the strategies of the transport sector and integrating environmental concerns.

Recommendation 12.6:
The Ministry of Waters and Environmental Protection and the focal point on environmental matters in the Ministry of Public Works, Transport and Housing should cooperate on a regular and practical basis on transport issues.

Chapter 13

ENERGY AND ENVIRONMENT

13.1 Energy production and use

Primary energy supply

The primary sources of energy in Romania are traditionally domestic (Table 13.1). After 1989, the energy supply decreased. The introduction of nuclear power generation has led to a decrease in the use of fossil fuels. The consumption of primary energy resources (domestic and imported) is expected to increase to about 85 million tce in 2020 (Medium-growth scenario, World Bank, 1998) with an annual growth of 0.5% to 1.5%.

Coal supply

The coal supply comprises hard coal and lignite, which are mainly used for conversion into other forms of energy (Table 13.2). Coal is primarily used for conversion in large plants with a potential for increased efficiency and pollution control measures. This is reflected in the national energy policy, which aims at the implementation of the EU Directive on the limitation of emissions from large combustion plants, 88/609/EEC, 94/66/EEC and proposal 599PC064 in new plants and, after a period of some years still to be fixed, in old plants.

Coal mining is a national monopoly. The sector is open to private investments, but so far investors have been attracted neither by the market nor by the conditions offered. Coal miners have even been invited to take over the mines and operate them on a commercial basis.

The consumption of hard coal and lignite is expected to drop from about 11 million tce in 1998 to about 6 million tce in 2020 (Medium-growth scenario, World Bank, 1998). The forecast also estimates an increase in the import of hard coal, leaving only about 2.5 million tce from domestic production. However, the forecast seems to minimize the social aspect of a reduction in domestic production. The change to alternative fuels, especially natural gas, that has already started is substantially slower than forecast. This change has caused social difficulties in the coal-mining regions, as the creation of alternative jobs has failed to compensate for the loss of jobs in the mining industry.

Table 13.1: Primary energy consumption, 1989-1998

million toe

	1989			1993			1998		
	Total	**Domestic**	**Import**	**Total**	**Domestic**	**Import**	**Total**	**Domestic**	**Import**
Total consumption	**62.793**	**45.213**	**17.580**	**40.833**	**29.675**	**11.158**	**36.751**	**26.238**	**10.514**
Coal	6.190	2.943	3.248	3.336	1.759	1.577	3.469	1.289	2.179
Lignite	8.733	8.324	0.409	5.421	5.340	0.081	3.697	3.648	0.049
Oil	15.965	8.716	7.249	11.528	5.689	5.839	10.403	5.521	4.881
Gas	28.871	23.631	5.240	18.181	14.965	3.216	13.619	10.250	3.369
Nuclear power	-	-	-	-	-	-	1.383	1.383	-
Hydro power	0.971	0.971	-	0.981	0.981	-	1.451	1.451	-
Electricity	0.601	-	0.601	0.144	-	0.144	0.036	-	0.036
Renewable sources	0.523	0.523	-	0.872	0.872	-	2.691	2.691	-
Other energy sources	0.941	0.107	0.834	0.369	0.069	0.301	0.004	0.004	-

Source: ISPE (Design and Research Institute), 2000.

Table 13.2: Conversion and consumption of hard coal and lignite, 1989-1998

million toe

	Hard coal			Lignite		
	1989	**1993**	**1998**	**1989**	**1993**	**1998**
Conversion of primary energy						
Total	**5.651**	**1.242**	**3.456**	**7.478**	**5.293**	**3.688**
Coke ovens	4.336	-	2.631	-	-	-
Power plants	0.982	1.005	0.684	5.381	4.128	2.674
Heating plants	0.188	0.237	0.140	2.080	1.165	1.014
Others	0.146	-	-	0.018	-	-
Consumption of primary energy						
Total	**0.488**	**0.081**	**0.084**	**0.453**	**0.131**	**0.015**
Energy producing industry	0.238	-	0.048	-	-	0.003
Industry	0.079	0.038	0.031	0.107	-	-
Agriculture	0.008	-	-	0.017	-	0.001
Construction	-	-	-	-	-	-
Transport	-	-	0.001	-	-	-
Service	0.053	-	0.001	0.060	0.006	0.001
Household	0.111	0.044	0.004	0.269	0.125	0.010

Source: ISPE (Design and Research Institute), 2000.

Table 13.3: Conversion and consumption of oil and gas products, 1989-1998

million toe

	Oil products			Gas products		
	1989	**1993**	**1998**	**1989**	**1993**	**1998**
Conversion of primary energy						
Total	**5.049**	**3.579**	**3.123**	**16.569**	**10.413**	**7.611**
Coke ovens	-	-	-	-	-	-
Power plants	1.590	1.013	0.628	5.843	3.661	1.969
Heating plants	3.166	2.567	2.352	10.243	6.751	5.341
Others	0.293	-	0.143	0.484	0.000	0.301
Consumption of primary energy						
Total	**7.186**	**5.409**	**6.769**	**12.041**	**7.200**	**6.323**
Energy producing industry	0.956	0.970	0.173	0.874	0.602	0.267
Industry	2.153	0.838	1.835	9.869	4.560	3.353
Agriculture	1.063	0.650	0.437	0.027	0.050	0.044
Construction	0.522	0.150	0.398	0.047	0.064	0.017
Transport	1.391	2.603	3.496	-	-	0.080
Service	0.619	0.184	0.268	0.145	0.238	0.314
Household	0.483	0.016	0.163	1.079	1.686	2.248

Source: ISPE (Design and Research Institute), 2000.

Oil and gas supply

For many years the strategy has been to import crude oil for refining, then use the low-grade oil products on the domestic market and export the high-grade products. This has had a substantial environmental impact. The supply of oil and gas products has been liberalized and the national oil and gas companies now have to operate in a competitive market. The change has resulted in a sufficient supply of these products and the introduction of new products on the market.

A typical feature of oil products in Romania is their growing consumption in the transport sector, thereby making the sector responsible for an increasing share of total CO_2 emissions (Table 13.3).

Traditionally, natural gas is mainly used in power and heating plants. Natural gas has begun to be used for home heating, but development is slow and so far there has been no attempt to find the optimal form of supply. Liquid gas is being used to a small degree for heating purposes. Demonstration projects on the use of liquid gas in the transport sector are ongoing.

The consumption of oil products is expected to increase from about 16 million tce in 1998 to about 23 million tce in 2020 (Medium-growth scenario, World Bank, 1998). However, within the same period domestic production is expected to decrease from 9 million tce to about 5.5 million tce.

The consumption of gas products is expected to rise from about 22 million tce in 1998 to about 48 million tce in 2020 (Medium-growth scenario, World Bank, 1998), whereas domestic production is expected to fall from about 16.5 million tce to about 14 million tce within the same period.

Electricity generation (hydro, thermo and nuclear) and use

Power generation is mainly based on domestic coal (hard coal and lignite) and natural gas almost 50/50 (Table 13.4). The generation pattern has been changed by the introduction of nuclear power and the better use of hydropower resources (Figure 7.6), but most generation still takes place in old thermal power plants. The average efficiency of thermal generation is about 30-35%. Considering the extensive use of gas, cogeneration and efficiencies obtainable by the use of modern technology within these areas, the current efficiency is very low and could easily be improved.

A rehabilitation programme for thermal plants has been initiated, but so far the objective of this programme has been to extend the life of the plants rather than increase their efficiency and reduce the environmental impact of power generation. The medium-term development strategy addresses this problem with two main issues:

- The rehabilitation and modernization of the electricity production, transmission and distribution grids and the decommissioning of old and inefficient capacity.
- The development of new cogeneration capacity using natural gas and nuclear capacities.

The development of nuclear energy is included in the national energy plan. With one unit in operation and with the commissioning of unit 2 at the Cernavoda plant planned for 2003-2004, total nuclear generation of about 3.8 million tce will cover the expected increase in demand in the short term and allow further reduction in the consumption of the most polluting fuels. In the medium and long term these existing plants are scheduled for decommissioning and replacement with new highly efficient thermal units designed to cover the district heating demand through CHP production.

Renewable energy sources play no role in current power generation. Some minor demonstration projects (€ 3-5 million investment) are included in the short-term action plan. There is no incentive for private investment in this field.

On paper power generation has been liberalized. Private investors are invited to participate in the development of the sector, but so far only two private investors have been attracted by the legal, commercial and market conditions offered.

Electricity consumption has fallen by about 50% over the past decade. This drop is mainly in industry, whereas household consumption has increased (Table 13.5). The widespread use of electrical heating due to an insufficient supply of district heating is one reason for the increase in household consumption, and the marked increase in the number of household appliances is another. In recent years, air-conditioning has also contributed to the increase in consumption.

Forecasts (Medium-growth scenario, World Bank, 1998) indicate an increase in power demand to about 78 TWh in 2020. Condensing units using natural gas will be decommissioned during this period and replaced with cogeneration units and combined-cycle units. Also, a number of units using hard coal and lignite will be decommissioned and replaced by combined-cycle units.

Table 13.4: Power generation, 1989-1998

TWh

	1989	1993	1998
Total	**75.851**	**55.476**	**53.496**
Total thermal	63.223	42.708	34.617
Hard coal and lignite	24.402	19.091	14.470
Oil products	8.506	5.173	4.016
Gas products	28.860	17.997	10.177
Other fuels	1.455	0.447	5.954
Hydro	12.628	12.768	18.879
Nuclear	-	-	-

Sources: ISPE (Design and Research Institute), 2000 and Romanian Statistical Yearbook, 1999.

Table 13.5: Consumption of power, 1989-1998

TWh

	1989	1993	1998
Total	**71.402**	**42.687**	**41.028**
Industry	55.573	29.191	27.917
Agriculture	4.169	1.959	1.311
Construction	1.511	0.593	0.413
Transport	2.921	2.207	1.996
Service	2.932	1.714	1.474
Household	4.296	7.023	7.917
Losses and discrepancies	4.449	12.789	12.468

Sources: ISPE (Design and Research Institute), 2000 and Romanian Statistical Yearbook, 1999.

Table 13.6: Consumption of heat, 1989-1998

PJ

	1989	1993	1998
Industry	517.068	259.645	168.994
Agriculture	22.868	9.667	4.466
Construction	5.790	1.784	1.096
Service and transport	39.644	37.157	19.628
Household	26.195	129.347	139.880

Source: ISPE (Design and Research Institute), 2000.

Heating

District heating is the main system for heating and hot water supply in Romania, with 262 systems in operation. More than 80% of the population and a large number of industries receive district heating.

The main producer of heat is the national electricity company. The remaining production is from industrial plants and from district heating utilities.

The district heating systems are high-temperature systems with transmission systems to thermal substations where heat and hot tap water are

prepared and distributed to the consumers. A major problem in many cities is that the cutback in industrial production has resulted in the closing of the industry that used to supply the population with surplus heat. As a result, the municipal district heating companies have taken over the boilers and are now operating them for district heating purposes only, an operating mode for which the boilers were not designed and which is inefficient.

The lack of maintenance of the district heating systems results in large heat and water losses and an insufficient supply. Some rehabilitation projects have been implemented or are in the process of implementation, making it difficult to calculate the real demand at present.

District heating was a national monopoly, but in the early nineties the companies were organized as independent companies (so-called *Regia Autonome*), and control of the companies was transferred to the municipalities. A few companies are operated as private companies based on concession contracts issued by the municipalities, and the plan is to introduce this concept in more cities with support from the European Bank for Reconstruction and Development (EBRD). However, the conditions of the concessions offered do not attract tenderers in open international competition.

The national power company's policy for heat generation is to continue to supply existing consumers and to connect new ones, if generation capacity is available. In the short term, a capacity of 450 MW cogeneration will be rehabilitated, and the construction of an additional capacity of 240 MW will be completed and thus cover short-term requirements. A cogeneration capacity of 1,475 MW out of 4,800 MW will end its useful life within a few years.

The consumption of heat is expected to increase from 334 PJ in 1998 to about 480 PJ in 2020 (Medium-growth scenario, World Bank, 1998).

Renewable energy sources and biofuels

Renewable energy sources (e.g. wind power, solar energy) have only been used in demonstration projects. Biofuels and waste incineration have been used in Romania for many years, and have notably increased in recent years (Table 13.1).

A programme for renewable energy sources prepared before 1989 was reported to be unsuccessful, and a new programme is now ready for implementation, if approved. This programme includes solar energy, photovoltaic energy, wind energy, biomass energy and geothermal energy. However, investment in this programme amounts to only € 15 million and so far only two demonstration projects for biomass use in rural areas have been carried out.

Final consumption

Final consumption of energy has dropped about 50% since 1989 mainly due to a decrease in industrial consumption. The increase in the household sector is mainly due to an increase in supply, which before 1989 was far from sufficient.

13.2 Environmental pressures from the energy sector

Energy intensity

The energy consumption in Romania has regularly decreased since the early 1990s (Table 3.8). If the development forecast in the World Bank study of 1998 turns out to be true, energy intensity will be about 2.3 toe/inhabitant in 2020, which shows that the potential for energy saving is not expected to be attained. Furthermore, the World Bank expects a proportional ratio between economic growth and energy consumption. However, it has been demonstrated in a number of EU countries that this is not necessarily the case if a comprehensive energy-saving policy is implemented.

Pollution

The energy sector is by far the largest contributor to air pollution in Romania. Compared to countries of the EU region, Romania produces a high ratio of sulphur oxides and nitrogen oxides per capita. However, as a consequence of the decrease in energy consumption, air pollution has also decreased during the past decade (Table 6.1 and Figure 6.1 in Chapter 6). The World Bank study of 1998 forecasts CO_2 emissions in 2020 to be at the same level as in 1991. Furthermore, a small decrease in the emission of other greenhouse gases is forecast.

Table 13.7: Final energy consumption, 1989-1998

million toe

	1989	1993	1998
Industry	61.522	46.640	21.362
Agriculture	3.179	1.696	1.128
Construction	1.372	0.477	0.757
Transport	2.584	4.436	6.118
Service	3.301	2.798	1.478
Household	8.023	9.539	13.463

Source: ISPE (Design and Research Institute), 2000.

Table 13.8: Energy consumption per inhabitant, 1989-1998

toe/inhabitant

	1989	1993	1998
Energy consumption per capita	2.854	1.856	1.671

Source: ISPE (Design and Research Institute), 2000.

Energy efficiency and conservation potential in the economy

In general, energy efficiency is low in all sectors due to the use of inefficient equipment and a general lack of investment in modern technology. Consequently, the potential for energy efficiency improvement is very high. It is estimated that 'no-cost' saving measures could cut present energy consumption by some 15%.

The greatest energy saving potential lies within the industrial sector. The financially feasible saving potential in the most energy-consuming industries is estimated at 10 to 50% depending on the sector (Table 13.9).

Table 13.9: Potential energy saving in industry

%

Cast iron production	20
Steel production	20
Ammonia production	10-30
Sodium hyxdroxide production	15-30
Petrochemical sector	12-50
Cellulose and paper production	25-45

Source: ARCE Study, 2000.

The agricultural sector has energy saving potential only in general energy conservation. The sector is far from developed industrially and thus energy consumption is low. It is expected that the future development of the sector will be based on modern highly efficient technology (see SAPARD strategy for EU accession, Chapter 11).

The construction sector is still in difficulty, but things are getting better. Consumer demand for modern construction principles requires the introduction of new technologies, and these technologies are expected to be highly energy-efficient.

The transport sector is currently in a development process with the modernization of roads, railroads, buses and trains. It is undergoing significant changes resulting in a decrease in specific consumption (energy/km). At the same time, however, transport has increased and is expected to continue to do so in the years to come. Hence, even with a higher degree of efficiency in individual transport, overall consumption will increase (Chapter 12).

The potential for energy saving in the service and household sectors is large. Experience from other east European countries has shown that savings of

about 30% of initial consumption is obtainable by low-cost or medium-cost measures with a short payback time. So far, almost none of this potential has been realized in Romania.

13.3 Environmental policy and management of the energy sector

Sectoral policies, strategies and action plans (including EU accession obligations)

The Medium-term Development Strategy of the Romanian Economy (2000), which so far has been successful, foresees a decrease in energy intensity of 3% per year and describes the targets necessary to obtain this goal. The Strategy focuses mainly on the industrial sector and power generation. As for household energy savings, the Strategy is not popular with the population although energy bills often amount to 25-30% of the family budget compared with about 5% in EU countries. Energy saving in the transport sector has been neglected.

Policies aimed at reducing the environmental impact of the production, transmission, distribution and consumption of energy are mainly related to energy efficiency and are included in the National Energy Strategy and the National Sustainable Development Strategy, both approved by the Government in 1999. As concerns negotiations with the European Union, these policies are specified in the 2000 Medium-Term Development Strategy, which presents energy efficiency and the promotion of renewable energy sources as the main tools for sustainable energy development. As apparently it will take years to fulfil all European requirements, policies mainly concern new installations and equipment rather than existing ones.

The policy for the primary energy sector is to reduce the consumption of the most polluting fuels such as hard coal and lignite while simultaneously improving the quality of the domestic mineral resources, which will make their use more efficient. Several environmental problems persist such as the pollution of rivers, soil and groundwater. Hence, the policy aims to clean up past pollution and at the same time reduce the environmental impact of the future exploitation of domestic resources. However, funds are lacking and the coal mining industry is heavily subsidized by the State.

Two specific measures to improve the efficiency of boilers and furnaces and to introduce variable speed operation of pumps are about to be implemented. Other measures applied in EU countries, such as insulation and ventilation standards, will follow.

The national energy saving agency, ARCE, plays an important role in the Strategy, but the Energy Efficiency Law had just been passed by Parliament when the agency experienced a 50% reduction in size, including the closing of 8 of its 16 local agencies. While the new Law expresses Romania's desire to improve energy management, the problem is that the necessary resources to do so are unavailable.

There is no specific strategy for the agricultural, transport and construction sectors, but these sectors are to a certain extent covered by the Energy Efficiency Law and by the implementation of EU directives as agreed with the European Union.

The service and household sectors are covered by the Energy Efficiency Law, as municipalities with more than 40,000 inhabitants are obliged to draw up energy plans (so-called master plans). Measures focus on the consumption of energy for heating, which is the second largest energy-consuming sub-sector and also the second largest polluting sub-sector. The strategy focuses on more effective production, transmission and distribution by rehabilitating district heating systems, installing new CHP capacities and biofuel boilers. Several projects have already been implemented and additional projects are in progress or in the pipeline. Only a few measures have been introduced on the demand side, the most important of which is the mandatory installation of meters.

The EU directive on household appliances will be introduced by the end of 2002. It has also been decided to implement standard labelling measures. All EU directives will be implemented in the medium term according to the agreement with the European Union.

The strategy on renewable energy sources is limited to five full-scale biofuel projects and a number of demonstration projects. The legislation includes no specific incentive for the use of renewable energy sources.

Legal framework

The Energy Efficiency Law was passed by Parliament in the autumn of 2000 and is in line with EU legislation. The Law is supported by many sectors of Romanian society and an action committee was established to promote it. The Law

aims to strengthen investor confidence in the energy efficiency sector by:

- Removing legal and tax barriers to private sector implementation of energy efficiency projects
- Establishing provisions for the creation of a fund supporting energy efficiency investments
- Removing legal uncertainties concerning investment in projects for energy conservation financed by private investors (ESCO Projects, etc.).

The Energy Efficiency Law introduced compulsory energy audits for industrial units with a consumption of more than 200 toe, plus the establishment of an energy management plan for industrial facilities with a consumption of more than 2000 toe. However, the framework for energy audits and energy management specifying the certification of auditors and the specific requirements to be fulfilled by energy management has not yet been established. The State-owned companies (most of the largest industries are still State-owned) pose a problem because funds are not available for energy audits and energy management. Local energy management centres will support small industries, but these centres have still not been established.

The environmental impact of energy production and consumption is also governed by other laws and governmental orders:

- Law No. 137/1995 on Environmental Protection
- Water Law No. 107/1996
- Law No. 111/1996 on the Safe Deployment of Nuclear Activities
- Urgent Ordinance No. 243/2000 on Atmosphere Protection
- Urgent Ordinance No. 244/2000 on Dam Safety
- Law No. 86/2000 on the ratification of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (1998)
- Urgent Ordinance No. 78/2000 on Waste Management
- Urgent Ordinance No. 11/2001 on measures for the procurement of non-ferrous materials and recyclable non-ferrous waste
- Urgent Ordinance No. 16/2001 on the management of recyclable industrial waste
- Law No. 22/2001 on the ratification of the Espoo Convention on Environmental Impact Assessment in a Transboundary Context

Moreover, the environmental impact of energy production and consumption is governed by Government decisions based on the above-mentioned laws:

- Decision No. 395/1996 on the approval of a Special Programme of measures and actions to support the social-financial development of Tulcea district and the Danube Delta Biosphere Natural Reserve.
- Decision No. 172/1997 on the setting up of a National Registry of Possible Toxic Chemical Substances and its organization and operational procedures.
- Decision No. 450/1999 on the approval of Methodological Norms for the application of Urgent Order No. 88/1997 referring to the privatization of companies, with subsequent modifications and additions.
- Decision No. 1336/2000 on the decrease of the sulphur content of diesel oil.

The legal framework also includes orders from the Ministry of Waters and Environmental Protection:

- Order No. 125/1996 approving the Regulation procedures for economic and social activities with an impact on the environment
- Order No. 506/1996 approving the Regulation procedures for the import and export of substances, products and equipment mentioned in the annexes to the Montreal Protocol on Substances that Deplete the Ozone Layer
- Order No. 184/1997 on the Procedure for performing environmental audits
- Order No. 277/1997 approving the Norms for the contents of the technical documentation necessary for obtaining a water monitoring permit and certificate
- Order No. 278/1997 approving the Framework methodology and preparation for the prevention and control of accidental pollution
- Order No. 709/1999 on environmental permits for privatization issued by the relevant authority applying Government Decision No. 450/1999
- Order No. 699/1999 approving the procedures and authorities covering the issuing of water administration permits and certificates

- Order No. 340/2000 approving a works and services register kept by the authorities for environmental sustainability.

In addition, requirements are issued in the form of standards and norms:

- SR (Romanian Standard) No. 13.350/1996: Cleanness of cities and villages/ Urban and rural waste classification.
- SR No. 13.351/1996: Cleanness of cities and villages/ Overall prescription of selective refuse disposal.
- SR No. 13.253/1996: Packaging/Labelling of dangerous substances and chemical products.

Institutional arrangements

The Ministry of Waters and Environmental Protection has overall responsibility for the environmental aspects of energy production and consumption (Chapter 1). It cooperates with the environmental departments and agencies of other ministries, such as the Department of Energy of the Ministry of Industry and Mineral Resources and the Institute of Power Studies and Design. According to the Law on Environmental Protection, each ministry is obliged to establish its own environmental management and develop the relevant environmental strategies – in this respect the Ministry of Waters and Environmental Protection acts as a supervising authority.

Economic energy policy

Energy is still subsidized at all levels from exploration to consumption. The household sector in particular is heavily subsidized for social reasons. In 2000, VAT was introduced on energy (19%). The International Monetary Fund (IMF) recommends supplementary taxes of 20%. A road tax has been introduced on the consumption of petrol and diesel products (Chapter 12).

The establishment of regulatory authorities based on provisions included in the 2000 Energy Efficiency Law has started the liberalization of the energy sector. The regulatory bodies are organized within the Ministry of Industry and Mineral Resources, but act as independent authorities financed from the issuing of licences and from annual commissions paid by the operators.

The first step was to break up the sector into production, transmission and distribution companies. The generation of power is divided into thermal, hydro and nuclear producers and independent producers. The transmission (the market operator) of power and natural gas remains a State monopoly. The national power company and the municipalities own the distribution systems for power and heat. This distribution is subject to privatization (concession agreements), if so decided by the company or municipality. The distribution of oil products is fully liberalized and the market is open to free competition. Free competition has also been established on the natural gas market, but the State-owned company still has the right to sell domestic gas, which is cheaper than imported gas.

The second step, to open the energy market for consumers, is still ongoing. So far, only large consumers (about 10% of consumption) can benefit from liberalization, but the intention is to extend the share of liberalized distribution in accordance with EU policy.

The pricing of energy is controlled for the non-liberalized market by the regulatory authorities. Cost-related pricing is the principle applied.

Electricity is subsidized for the household sector with a “lifeline” tariff for the first 100 kWh/month. If consumption exceeds this level, the consumers pay the cost-related tariff.

The Government sets natural gas and district heating tariffs for household consumers. Hence, the Government subsidizes the difference between the cost-related tariff and the tariff it sets.

13.4 Conclusions and recommendations

Primary energy supply

The scenario for future development promoted by international institutions advises a shift from domestic fuels such as hard coal and lignite to imported fuels, especially natural gas. This scenario goes against Romania’s short-term interests as far as social aspects, security of supply and the economy are concerned. A more environmentally friendly use of domestic resources, including abatement devices on air emission gases, would certainly be more realistic in the present situation. In particular it would help find longer-term solutions to possible related social conflicts (mine closure).

Recommendation 13.1:
The Government should encourage the development and introduction of more efficient clean coal technologies, flue-gas cleaning, and the use of residuals and, when environmentally acceptable and economically feasible, continue using domestic resources to avoid social conflicts.

The EU directives have been incorporated into Romanian legislation, but are still not implemented. A condition for the use of domestic hard coal and lignite should be that pollution control measures based on modern technology are introduced at the operational level.

Recommendation 13.2:
The Ministry of Waters and Environmental Protection should start implementing the EU Directives on the limitation of emissions of volatile organic compounds (1999/13/EC) and on the limitation of emissions from large combustion plants (88/609/EEC, 94/66/EEC and proposal 599PC064)

Oil and gas supply

At present, natural gas is used mainly in large, old, inefficient centralized power and heating plants. Hence, since it is used inefficiently, its impact on the environment is not realised to the fullest extent possible. Therefore, other measures should be taken as well. The natural gas should be distributed to sites closer to the consumers where the full benefit of its use could be obtained. This decentralization of heat production would reduce transmission costs (investment in transmission systems, pumping costs and heat losses). An important side effect of decentralized heat production is also the reduction of losses in the power system. At present, the replacement or refurbishing of obsolete plants is being considered; it is therefore an appropriate period for switching to such a decentralized system, possibly step by step, where investments are not easy to obtain.

Natural gas offers the possibility of environmentally acceptable combustion close to the consumers together with reductions in transmission and distributions costs. Small and medium-scale CHP plants can, thanks to modern technology, obtain almost the same high efficiencies as large-scale plants at only slightly higher specific building costs. To obtain the highest possible efficiency and the optimal size of the plants, the plants must be designed according to heat demand and operated at full load (or almost full load) for the necessary hours per day according to seasonal demand variations – a typical load duration would be 24 hours per day in winter and 6 to 8 hours per day in summer. This operation mode can be obtained through the installation of heat storage, which also offers the possibility of using the plants at peak-load capacity for power production.

Recommendation 13.3:
To draw maximum benefit from its use, natural gas should be used in new, decentralized and highly efficient combined heat and power (CHP) plants designed according to the heat demand.

Public heating

The district heating networks are old, worn out and based on a high-temperature concept. Rehabilitation is currently being undertaken on the basis of design criteria established two or three decades ago. At the same time the huge energy savings possible at consumer level are not yet being achieved. Consumer awareness should be raised and a higher cost for energy could be the trigger for saving energy. The energy pricing strategy should be revised and incentives for saving energy introduced. This does not preclude the retaining of special social measures for those who cannot afford to pay the true energy cost.

A so-called lifeline tariff ensuring that everybody can have a minimum of heat and hot water at an affordable price should be applied for social reasons, as a large number of consumers cannot pay a market tariff in the current situation. However, the current subsidies scheme also supports those consumers who can afford to pay the full tariff. High levels of consumption ought to be taxed and the income from taxation could be used for a fund to promote energy conservation.

As consumption would decrease due to energy conservation, the temperature at the boiler could be decreased correspondingly, reducing heat losses in the system. The introduction of variable speed control on circulating pumps can ensure suitable cooling of the water circulated, reducing pumping costs substantially. Automatic pressure drop control ought to be introduced in substations and buildings to ensure a sufficient flow (and no more). A side effect of heat control is increased comfort for the consumers.

Experience in other east European countries and also a number of projects in Romania indicate that, when metering is introduced, the savings will be

10-20%. A first step could be the introduction of metering per block of flats or per floor by the utilities to promote individual metering by private initiative.

Energy auditing is an element of the Energy Efficiency Law, but a detailed scheme for audits and their execution should be established and initiated immediately. The audits should result in recommendations for feasible energy conservation measures, and their implementation should be promoted by taxation and subsidies (a revolving fund). Most of the houses were built in the fifties, sixties and seventies, and the insulation codes and standards reflect the price of energy at that time. Most of the buildings need renovation due to lack of maintenance. It is important that up to date building codes and standards are implemented at the same time.

Recommendation 13.4:
To establish a framework for feasible energy savings, the following measures should be introduced by the Ministry of Public Administration, the Ministry of Industry and Mineral Resources and the Ministry of Public Works, Transport and Housing:

(a) Replacement of consumer subsidies in the form of reduced energy tariffs by subsidies for energy saving measures;
(b) The application of modern heating concepts with low temperatures, flow and temperature control and the control of heat distribution in buildings and to the consumers;
(c) The installation of household meters to promote energy saving and fair payment;
(d) The establishment of energy auditing procedures for industry as well as building codes and standards.

Renewable energy sources and biofuels

The current programme has only very limited funds available for demonstration projects and so far only two biofuel plants have come on stream. Moreover, demonstration projects are mostly financed by foreign funds. The Romanian authorities' interest in renewable energy sources seems very low. They should pay more attention to the establishment of a political and legal framework for the promotion of renewable energy sources and biofuels.

Romania has a large untapped potential of renewable energy and biofuels. The consumption of hot water peaks in the warmest summer months, when solar energy could provide part of it. Romania is a major wood producer with a large quantity of surplus wood available for energy production. On the other hand, Romania, because of its very nature, will never be a major producer of wind energy. A promotion campaign and taxation and subsidies could ensure the use of available renewable energy sources.

Recommendation 13.5:
A national strategy for the use of renewable energy sources and biofuels should be implemented under the guidance of the Ministry of Industry and Mineral Resources. Favourable conditions (e.g. priority in production, attractive tariffs, and smoother approval processes) to attract private investments should be created to facilitate the investments in renewable energy sources and biofuels.

Environmental impact of the energy sector

Although the environmental impact has been lower over the past decade because of a decrease in demand and production, following the recommended fuel supply strategy over the long term (World Bank study, 1998) would result once again in a pollution level similar to that in the late 80s. This indicates a lack of policies on energy saving, the use of renewable energy resources and of modern technologies to obtain higher efficiencies and on the reduction of the environmental impact of energy consumption. It also indicates that expectations are limited as to the impact of the Energy Efficiency Law. The current subsidy scheme especially for the household consumption of heat and gas offers no incentive for energy saving.

It is true that part of the population cannot afford the real cost of energy, but this should be solved through social compensation or help. The bulk of the population can afford energy prices higher than those of today. Consequently, most consumers could be motivated to save energy and thereby money, and there is room for incentives to install private meters so that these consumers pay only for what they consume and no more. This strategy has proved successful in countries in a similar economic situation (Estonia, for instance). The State could also help to implement this strategy and other actions to save energy. One problem in Romania is finding the money to invest in the required measures. Soft loans should be offered to those who would be ready to invest in energy saving, be they individuals or private enterprises.

Recommendation 13.6:
The Ministry of Industry and Mineral Resources should draw up an energy saving policy to stabilize total energy consumption at the current level by removing subsidies on energy and introducing energy taxes and subsidies for socio-economically feasible energy saving measures. Subsidies for social reasons should be considered separately, as they belong among the social policies for people in need (pensioners, the disabled, the unemployed, etc).

The energy policy should be based on an integrated resource planning (IRP) approach, which takes into consideration energy saving as an alternative to the building of new production capacities. By identifying the energy saving options and calculating their specific costs in terms of €/GJ or €/kWh it could properly be demonstrated that many of these options are economically feasible. The problem here is how to provide funds for energy saving, as all over the world it is easier to obtain financing for a production unit than for alternative energy savings. This problem should be discussed with the financing institutions.

An energy conservation fund is a positive element that is included in the Energy Efficiency Law, although the problem is the long time it will take for this revolving fund to be large enough. To obtain a sufficient and hence efficient volume for this fund – *say € 200 million* – in the short term it might be an idea to start the fund by taking out a loan. The fund could then be used to finance measures for saving energy in particular in the housing sector.

Recommendation 13.7:
To speed up the establishment of a financing scheme (revolving fund) for energy saving, the Romanian Government should consider the possibility of (a) obtaining financial support from international financing institutions and other potential donors; and (b) supporting building owners, flat owners' associations, small and medium-size enterprises, etc., through banks so that they can finance the most feasible energy saving measures identified during energy audits.

Policies, strategies and plans

Comprehensive policies and strategies have been decided at the political level and they should now be implemented. However, when the Energy Efficiency Law was passed by Parliament, the agency that has to implement it lost half its resources. What remains is totally insufficient to carry out the measures and actions envisaged in the Law.

Recommendation 13.8:
The Government should ensure that the ministries and agencies involved are given sufficient resources to develop and respectively implement the approved energy policies and strategies, especially the agencies involved in the implementation of the Energy Efficiency Law. Reporting and auditing tools should be used to monitor the agencies' performance.

Few of the standard energy saving measures implemented in most EU countries have so far been applied in Romania. The most widespread measures applied with good results in the EU countries are labelling and standards for:

- Refrigerators and freezers
- Tumble dryers, washing machines, washer-dryers, dishwashers, electric ovens, and lamps
- Hot water boilers
- Television sets, videocassette recorders and audio equipment.

Many more measures are applied in individual EU countries and many more are being drawn up. Standard energy saving measures could be introduced in Romania by the simple adoption of the measures used in EU countries. Detailed descriptions of the measures can be obtained from the International Energy Agency (IEA).

Recommendation 13.9:
Standard energy saving measures similar to those applied in EU countries should be urgently introduced in Romania. These measures should be widely promoted through television, newspapers and other media.

Economic context

Free competition has, in principle, been established in energy pricing, but so far private investment is very limited. The reason seems to be that the utilities are still centralized and that they are able to maintain their monopoly by proposing unacceptable conditions to potential investors. It will be difficult to convince private investors to enter the Romanian market on a strictly commercial basis without any guarantee of fuel supply, the sale of power and heat at fuel-cost-related prices or payment by the consumers. Investment in plants

with a lifetime of 20-30 years requires planning and some guarantee that the production can be sold.

Recommendation 13.10:
The authorities should draw up energy plans based on socio-economic criteria and should open concessions to tender for a minimum of 20 years offering a reasonable guarantee that the power and heat produced can be sold.

Chapter 14

HUMAN HEALTH AND THE ENVIRONMENT

14.1 The demographic and health characteristics of the Romanian population

Population dynamics

The population of Romania stood at about 22.5 million in 2000, 3.2% less than 1990. This decrease is due to negative natural growth (since 1992) and emigration. The population is getting older, with the proportion of people below 15 years of age decreasing (from 23.6% in 1990 to 18.7% in 1999) and of people 65 years of age or older increasing (from 10.4% to 13.0%, respectively). This dynamic of ageing is faster in Romania than the average in other central and east European countries, and is in fact fast approaching the EU age structure. However, the proportion of young people in Romania is still 2% above and that of older people 3% below the EU average.

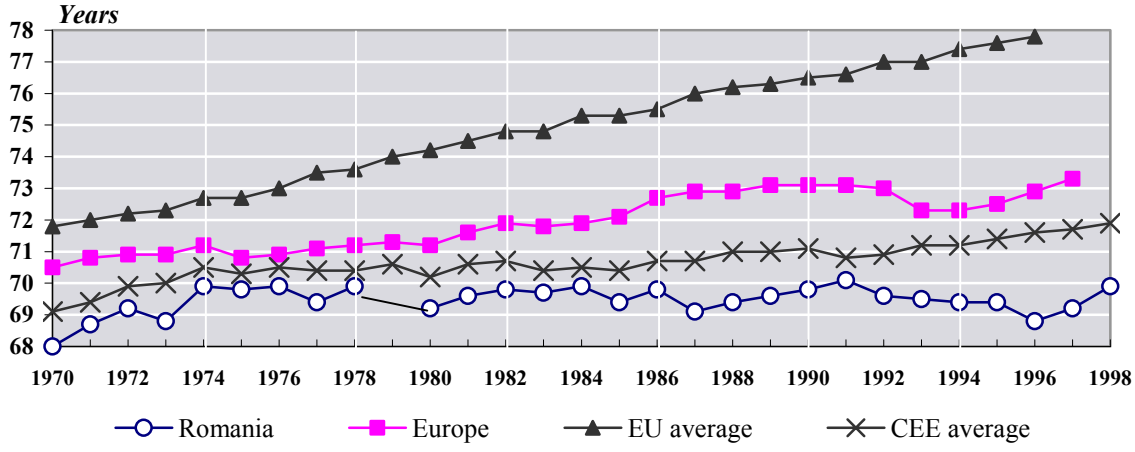
About 54.8% of the population lives in cities, and almost 10% are residents of Bucharest. This urban population percentage is much lower than the European average (73%). Average population density (94.1 people per km^2) is low, at only 87% of the central and east European average, and 53% of the EU average. In recent years, migration from urban to rural areas has been higher than in the opposite direction.

Mortality

Between 1992-1995, life expectancy declined by more than year, but it increased again to 69.9 years in 1998. It is still one of the lowest in Europe, respectively 2.0 and 7.9 years shorter than central and east European and EU averages (Figure 14.1). Within the country, life expectancy varies from 62.5 to 67.4 years for men (Satu-Mare vs. Bucharest), and from 70.7 to 74.9-75.0 for women (Satu-Mare vs. Bucharest and Covasna).

Infant mortality (20.5 deaths per 1,000 live births in 1998 and 18.6 in 1999), though declining, remains very high. In 1998, it was 1.6 times the central and east European average and 3.7 times greater than in the EU. Within the country, the rate varied from 11.8 (in Bucharest) to 33.2 (Bihor district) in 1999. Respiratory infections are the main cause of infant deaths. In Bihor district, deaths due to digestive system diseases are 10 times more common than in

Figure 14.1: Life expectancy at birth, 1970-1998



Source: WHO-HFA.

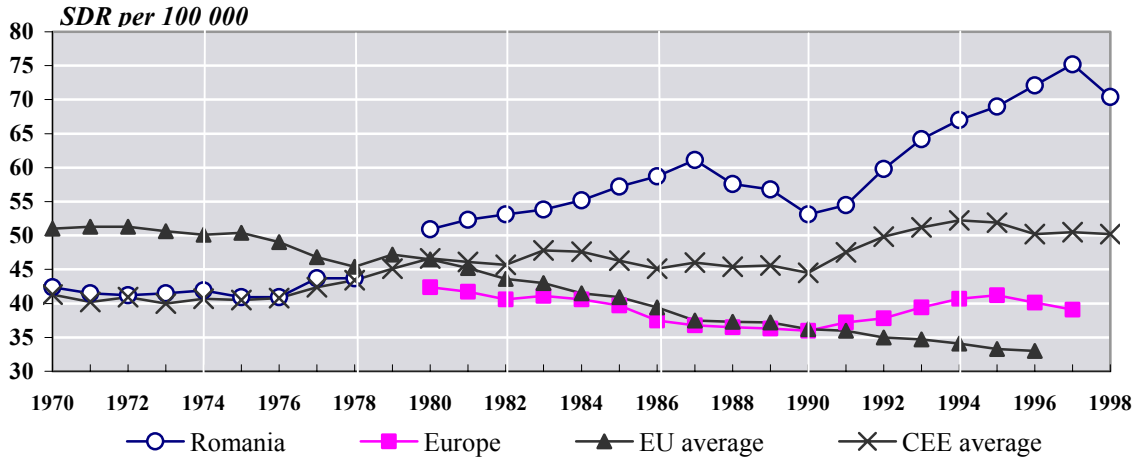
the other districts (5.0 per 1,000 live births vs. 0.6 national average), contributing substantially to the high level of infant mortality in that district. Post-neonatal mortality (11.1 per 1,000 live births in 1998) is also high in Romania, 1.9 times the central and east European average and 5.8 times the EU level. Post-neonatal mortality was twice as high in rural as in urban areas (13.0 vs. 6.6 deaths per 1,000 live births). This difference is much greater than that of mortality in the first month of life (8.8 vs. 8.3 per 1,000), indicating that hygiene, as well as access to effective medical care for children, are poorer in rural areas.

Cardiovascular diseases were registered as the cause of 61.3% of all deaths, tumours 14.6%, digestive and respiratory system diseases, as well as accidents, contributing some 6% each. This structure is markedly different from the average in central and eastern Europe and the EU, where cardiovascular diseases contribute 54% and 39% of deaths, respectively, and cancers 19% and 27%. Infectious and parasitic diseases cause 1.2% of deaths in Romania, as compared to 0.7% in central and eastern Europe, and 0.9% in EU. Age-standardized cardiovascular mortality for people of all ages was higher in Romania than in the rest of Europe during the past 30 years. In the age bracket below 65 years, the standardized death rates in Romania were close to the central and east European average until 1990. However, in more recent years, the rates have increased in Romania, and decreased in the remaining central and east European countries. There are no apparent risk factors for the increase in the rates of cardiovascular deaths below the age of 65, or for the consistently high rates of cardiovascular mortality in all ages in Romania. Tobacco smoking is not so widespread, and eating habits are close to the south European pattern.

Mortality due to digestive system diseases has also increased since 1990, and is now 50% above the central and east European average and twice as high as in the EU (Figure 14.2). Another worrying trend is the rise in tuberculosis, with mortality increasing from 4-6 per 100,000 in the 1980s to 12.2 in 1997. This increase was stopped in 1998, with a rate of 10.8, followed by 9.6 per 100,000 in 1999, but it is still much higher than in the rest of Europe: average rates are around 4.6 in central and eastern Europe and 1.1 in the EU. Both groups of diseases may be related to a broad combination of hygiene and environmental factors unfavourable for health.

The burden of disease can best be described by the Potential Years of Life Lost (PYLL), considering the age of death. In 1998, close to 1.5 million life years were lost due to premature death in Romania. The main causes of potential years loss were, for men, accidents (28.7%), cardiovascular diseases (25.8%), cancers (15.2%), digestive diseases (10.3%) and respiratory diseases (6.9%). For women, the main causes of PYLL were cancers (25.9%), cardiovascular diseases (24.6%), digestive diseases (8.4%), accidents (8.1%) and respiratory diseases (7.5).

Figure 14.2: Mortality due to digestive system diseases, 1970-1998



Source: WHO-HFA.

SDR: **S**tandardized **D**eath **R**ate.

Morbidity

According to the National Health Medical Survey, conducted in 1997, cardiovascular diseases or symptoms are prevalent in 38.4% of adults, digestive diseases in 16.3%, and chronic obstructive pulmonary diseases in 4.7% of the Romanian population over 15 years of age. All these rates were higher than in the previous survey conducted with the same methodology in 1989. Those data indicate that a large part of the Romanian population is more vulnerable to environmental hazards due to their poor health status. However, it is difficult to assess to what extent environmental conditions play a role in determining the prevalence of the diagnosed diseases.

The Cross-sectional Central European Study on Air Quality and Respiratory Health (CESAR), conducted in 1996, included four Romanian cities (Bucharest, Ploiesti, Baia Mare and Tirgu Mures). The Study included schoolchildren between 7 and 11 years of age. Table 14.1 summarizes the prevalence of respiratory symptoms reported in this study in the Romanian cities, as well as in the other study centres (four cities in each country) in Bulgaria, Czech Republic, Hungary, Poland and Slovakia. The variability of the symptoms' prevalence among the study areas in Romania was rather small, and all the results obtained in Romania were close to the middle of the range of frequency of the symptoms reported from the other countries.

Several diseases recorded under the communicable diseases registration system have a high risk of transmission through the environment. The registered incidence of diarrhoeal diseases decreased from 414 cases per 100,000 population in 1990 to 339 per 100,000 in 1997, but has again increased in more recent years (to 361 per 100,000 in 1999). The incidence of viral hepatitis (type A) decreased substantially in the 1990s compared with the previous decades, but is still double the central and east European average and almost ten times higher than in EU. The incidence of food-borne infections, including salmonellosis, remained at a level of 15-20 cases per 100,000 throughout the 1990s. Cholera was registered for the last time in 1995 (118 cases).

The incidence of viral hepatitis A shows substantial territorial variability, possibly indicating different health conditions. In 1999, the incidence of this disease in the Maramures district (228 per 100,000) was three times above the national average and almost 10 times higher than in the districts with the lowest incidence.

Trends in the incidence of tuberculosis confirm the pattern indicated by the mortality statistics. The incidence rates increased steadily in the 1990s, from 61 cases per 100,000 in 1991 to 104 cases in 1999. Even more disturbing is the doubling of tuberculosis among children (from 13 cases per 100,000 in 1990-1991 to 32 in 1999).

Table 14.1: Prevalence of respiratory symptoms among 7- to 11- year- olds*

age- and sex-standardized prevalence in %

	Cough, last winter	Wheeze, last 12 months	Asthma (ever)	Bronchitis (ever)	Allergy**
Bucharest	14.4	5.3	8.5	19.1	3.3
Baia-Mare	17.4	9.0	14.3	37.4	6.9
Ploiesti	19.3	5.7	11.1	25.1	2.8
Tirgu-Mures	11.1	5.5	17.0	50.0	3.6
Cities in other countries (min – max)	2.5 – 33.1	2.6 – 16.3	4.2 – 24.6	30.6 – 63.3	4.2 – 13.7

Source: Central European Study on Air Pollution and Respiratory Health. Study Results. July 1997.

Notes:

* Estimated by CESAR study conducted in 1996

** Doctor diagnosed allergy to inhalant allergen

14.2 Health risks related to environmental factors

Drinking-water supply and quality

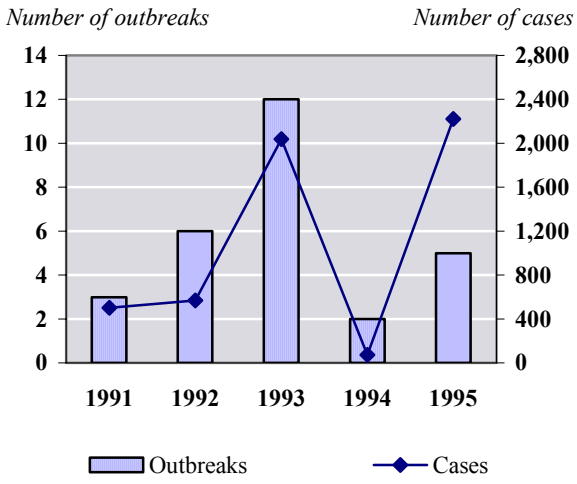
According to the 1992 census, 85% of the urban population and 16% of the rural population had their homes connected to water-supply systems. More recent information shows an increase in access to piped drinking water at home (inside or outside of the building) to 91.8% in the cities, but only to 33.5% in rural areas. Twenty-nine per cent of the population with access to piped water receive groundwater, 71% surface waters. An important problem affecting both the availability and the quality of drinking water is the leakage and intermittent supply. According to the 1998 Study on Drinking Water Quality Monitoring and Critical Points in Supply Systems of the Water Producers Association, over 35% of the volume is lost along the distributing pipes. It is estimated that some 50% of consumers have been affected by interruptions in supply lasting for at least 8 hours. The water available to most of the rural population without access to pumped water comes from about 1 million wells, mostly shallow (5-20 m depth) and susceptible to contamination.

Close to 19% of surface sources and 10% of groundwater sources used for drinking-water extraction have had no hygiene protection (data from 1991-1995).

Information related to the quantity and results of water-quality tests is very scarce and outdated. The most recent data analysed on a central level relate to 1995, when 3% of tap-water samples did not comply with microbiological standards and 8.4% breached physico-chemical standards. Up to 44% of the population received water with a residual chlorine level below standard. However, special studies performed between 1988 and 1996 analysing chlorinated pesticide residues in drinking water detected contamination exceeding the standards (MAC) in 73% of the samples.

Nor have the data on outbreaks of water-borne diseases been analysed centrally since 1995. According to the earlier data, a total of 30 outbreaks have been reported between 1991 and 1995 (Figure 14.3). Half the outbreaks were caused by the contamination of the water source and the other half by network deficiencies. In most of the outbreaks, the level of residual chlorine in water was found to be very low. Acute dysentery was reported in 28% of cases registered in the outbreaks, and hepatitis A in another 20% of cases. The fact that there has been no increase in incidence of those diarrhoeal diseases reported in statistical data for 1996-1999 indicates that the microbiological quality of drinking water has not deteriorated significantly in recent years.

Figure 14.3: Registered outbreaks of water-borne diseases, 1991-1995



Source: Institute of Public Health, Bucharest.

Other water-related health risks

The homes of 83% of urban residents and of 11% of the rural population are connected to sewers. Such poor coverage, especially in the rural areas, creates a risk of contamination of drinking water sources and can be the reason for the still-high incidence of gastro-intestinal infections.

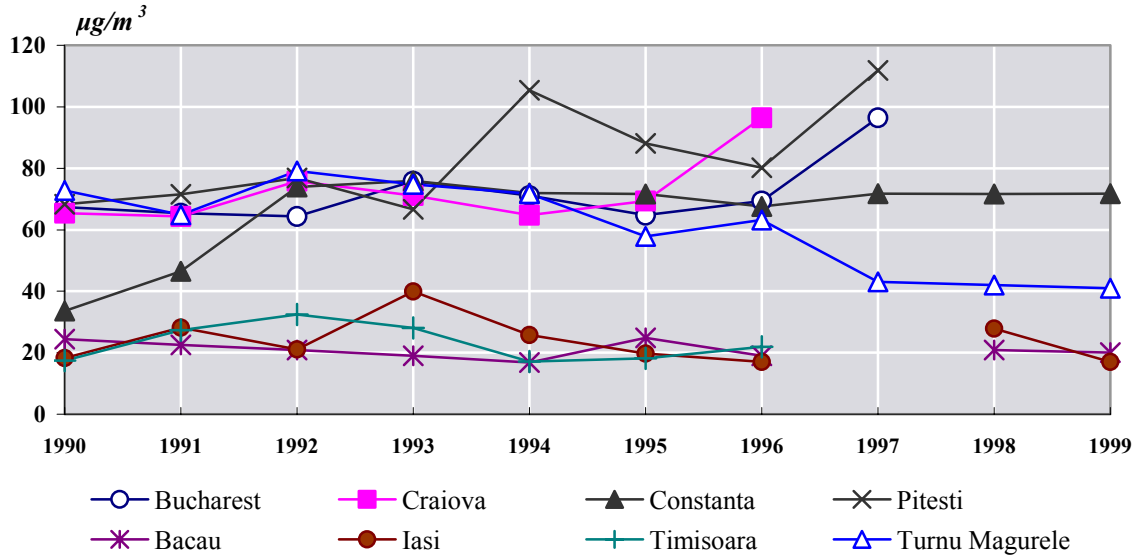
Recreational waters may also create a risk of transmission of communicable diseases, especially as most sewage is discharged without any treatment. According to data of 1998 (see Chapter 7), 17.9% of towns (among them Bucharest, Craiova, Galati, Braila, Drobeta-Turnu, Severin, Tulcea) have either no waste-water treatment plants or they are not operated and only 53 of the 15,779 rural settlements have waste-water treatment plants. Unfortunately, there are no data from recreational water quality monitoring available at national level. Present health standards, developed in 1988 and adjusted to EC Directive (76/160 EEC) with respect to the microbiological parameters in 1994, are believed to protect the health of bathers. However, a survey conducted in Bucharest in 1997 revealed that 10 out of 53 controlled bathing areas had no health permit.

Irrigation water is subject to monitoring and evaluation before the irrigation period. However, no data from this monitoring are available at national level. It is assumed that no evident health effects can be attributed to this water source at present, since the water in irrigation systems is not used for drinking or for recreational purposes. Nevertheless, such a risk does exist: a nationwide study conducted in 1988 showed that 90% of irrigation water used for vegetable and fruit production did not comply with relevant microbiological standards.

Air quality

The level of air pollution remains relatively high in many Romanian cities, as evidenced by the concentrations of NO_2 (Figure 14.4) and total suspended particles (TSP) (Figure 14.5). The high levels of both pollutants indicate that motor vehicle traffic is an important contributor to air pollution. The figures summarize the data from residential areas of the monitored cities, representing the average exposure of the population. According to studies conducted in various European and American cities, such exposures can lead to an increased incidence of acute and chronic respiratory diseases as well as to increased mortality. A precise assessment of the magnitude of the impact requires special studies. Romania participates in a collaborative, multicentre study APHEA2. The results of this study should confirm the extent to which the short-term changes of pollution in Romania affects the health of the residents.

Figure 14.4: Annual mean NO_2 levels in Romanian cities, 1990-1999



Source: Institute of Public Health, Bucharest.

In contrast to the pollution with suspended particles and NO_2, the concentration of sulphur dioxide is low (below 20 μg/m^3) in most Romanian cities. The exception is Constanta, where the annual mean concentration of SO_2 reported to the Regional Public Health Directorates has exceeded WHO Air Quality Guidelines levels since 1993 (with a maximum value of 63 μg/m^3 in 1997) (see Table 6.1 for National standards and WHO guidelines) and does not show any sign of declining. The cause of the high SO_2 levels in Constanta is the use of fuel oil with a high sulphur content by the local power plant, and not gas as in most other big towns. In Iasi the local central heating system also uses partly similar fuel oil and this resulted in high levels of SO_2 in 1995-1996. Such increased concentrations of SO_2 are usually associated with increased levels of fine particulate matter (which includes the products of atmospheric reactions), which has an affect on health

Some of the air-quality data collected using a standardized protocol and quality assurance programme of the CESAR study in the period from November 1995 to October 1996 are presented in Table 14.2. CESAR is the Central European Study of Air pollution and Respiratory Health funded by PHARE that was made on respiratory symptoms of 7- to -11- year olds related to exposure to particulate pollution in 25 cities of Central Europe. The concentrations were measured in one fixed background sampling site in each city. 24-hour concentrations of PM10, PM2.5 and SO_2 were measured every sixth day, while the NO_2 concentrations were measured during consecutive periods of 12 days using passive samplers. For comparison, the table includes the results of measurements conducted with the same methods and in the same period in the other study centres in Bulgaria, the Czech Republic, Hungary, Poland and Slovakia. It is noted that the measurements concerned here are referring to the MAC and not to the emission standards as applied in air monitoring in Chapter 6.

Pollution with particulate matter (PM10 and PM2.5) measured in the CESAR study was high in the Romanian cities in comparison with both the other cities of the study and with the current EU limit value for PM10 (40 μg/m^3). Such levels are certainly a health concern, and may lead to serious health problems (see also Chapter 6 and Table 6.3). In contrast to PM pollution, the levels of gaseous pollutants measured by the CESAR study were rather low in the Romanian cities.

A small study on the indoor concentration of selected air pollutants in Bucharest conducted in the summer of 2000 indicates that the population's exposure to air pollution, especially to suspended particles, is very high indoors also. The indoor levels of TSP (representing 30 min. mean) were in the range of 200-400 μg/m^3, and the mean NO_2 level in the range of 50-90 μg/m^3.

Table 14.2: Concentration of air pollutants in Romanian cities, 1995-1996

annual means, μg/m^3

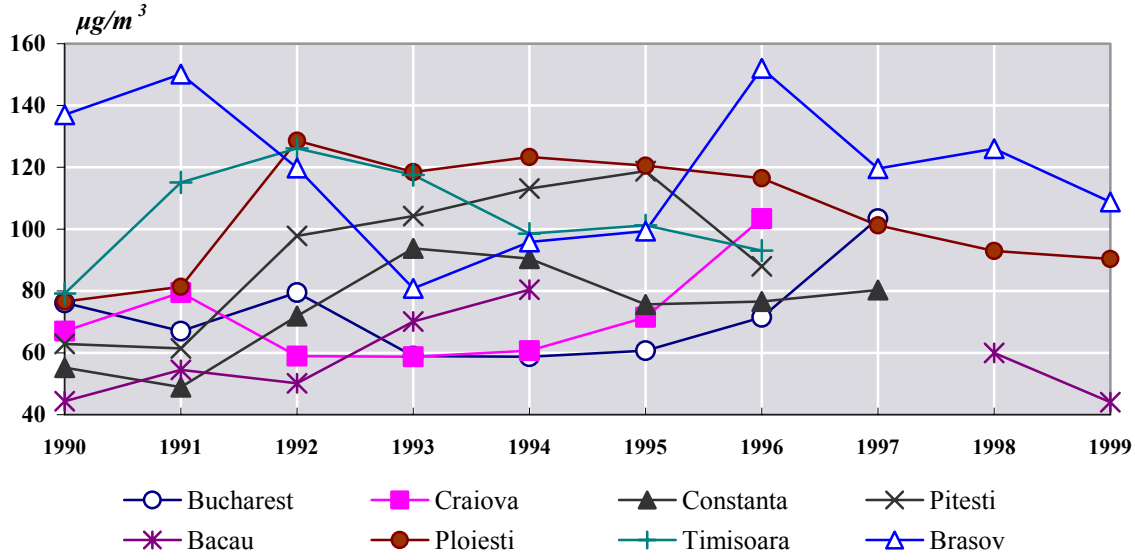
	PM10	PM2.5	SO_2	NO_2
Bucharest	93.0	53.0	7.0	20.0
Baia-Mare	73.0	41.0	17.0	15.0
Ploiesti	79.0	56.0	16.0	22.0
Tirgu-Mures	88.0	62.0	-	12.0
Other countries (min – max)	41 - 93	29 – 67	11 – 155	6 – 66

Source: Central European Study on Air Pollution and Respiratory Health. Study Results. July 1997.

Note:

* Measured by the CESAR study

Figure 14.5: Annual mean TSP levels in Romanian cities, 1990-1999



Source: Institute of Public Health, Bucharest.

The concentration of lead (Pb) in ambient air is measured in several locations in Bucharest, showing a decline in the average background concentration of lead in air from 0.94 µg/m^3 in 1995 to 0.19 µg/m^3 in 1999. However, a north-eastern part of Bucharest is under the influence of a battery-producing plant, and the annual average of Pb concentration near the plant was 0.96 µg/m3 in 1999, i.e. markedly exceeding the WHO Air Quality Guideline level of 0.5 µg/m3. Until 1995, the lead concentration in air was also monitored in cities with lead-emitting industries (Baia Mare, Copsa-Mica, Medias and Zlatna-See; see Chapter 6). In the 1990-1995 period, annual mean levels in those cities varied between 0.6 and 2.6 µg/m^3, with no apparent indication of a reduction in pollution.

The population's high exposure to lead was confirmed by a study conducted among one to seven-year-old children in Bucharest. Blood lead levels (PbB) exceeded 100 µg/l in 58% of the children, and in 12% PbB levels were in the range of 200-440 µg/l. Such levels are a health concern and indicate that the neuro-behavioural development of a substantial proportion of children in Bucharest may be adversely affected by the exposure.

In the early 1990s, several studies found high levels of exposure to lead in the populations of the highly polluted cities of Baia Mare, Copsa-Mica and Zlatna. One of the studies, conducted by the Cluj-Napoca Medical Centre in Copsa-Mica schoolchildren in 1993, found that PbB levels exceeded 300 µg/l in 85% of children, and exceeded 700 µg/l in 7%. These studies prompted action to reduce exposure. Another study was conducted in Zlatna in 1994-1997. It concluded that the air quality and exposure monitoring capacities of local EPIs should be strengthened and that an awareness-raising campaign should be conducted to inform the public how to avoid exposure. As a result of this campaign, there was a 25% reduction in the mean PbB level in children, from 400 to 280 µg/l. Similar information campaigns were conducted in Copsa Mica and Baia Mare, but their effectiveness was not assessed. One can assume, however, that even with a reduction in lead emissions from industry the risk of exposure is still high in those populations due to the accumulation of the lead on the ground over the past decades. The lack of data on ambient lead concentration, as well as on population exposure levels, makes the assessment of the present risk impossible.

Solid and municipal waste

There is no precise information making it possible to assess the risk to health of the collection and storage of municipal and solid wastes. Some conclusions can be drawn from the study conducted in the mid-1990s, when municipal waste

collection and storage were very frequently inadequate. Municipal waste was stored outside houses in open bulk containers in 58% of the sites, and in another 26% the waste was stored directly on the ground. Complaints about the odours from waste storage were reported by 82% of the interviewees, and 58% were dissatisfied with the waste collection system. Deficiencies in household waste storage, collection and removal were reported by 40% of the households included in a nationwide study conducted by the Bucharest Institute of Public Health in the late 1990s. In 77% of the flats studied, insects or rodents were reported to be present.

Almost all municipal waste is landfilled; 26% of the landfills are controlled, and only 10% of the sites have an environmental permit. In the mid-1990s, more than 60% of medical facilities sent their wastes to uncontrolled municipal waste sites. Medical waste poses a major risk to the environment and the health of patients, medical staff and the general population. According to recent legislation (Ministry of Health Ordinance No. 663/1999 regarding medical waste management), hospital waste is sorted: hazardous waste (infectious waste, needles, body parts) is burned at the hospital incinerator and non-hazardous waste is still disposed of in landfills. Ministry of Health Ordinance No. 663/1999 describes the methodology for collecting data and for creating a national database on medical waste. The data obtained are sent to the Bucharest Institute of Public Health for processing.

Direct contact with waste, contact by rodents, birds and other animals with waste as well as the penetration of hazardous materials from waste create a risk to the health of the population. Some indication of the poor hygiene conditions still prevailing at the end of the 1990s is the incidence of leptospirosis, a parasitic disease that can be related to contact with waste. While fewer than 300 cases were registered in 1992-1993, this number was 557 in 1998, and 755 in 1999 (with more than 1/5 of all cases registered in the Botosani district).

Numerous industrial landfills are located close to human settlements and affect the environment. Some 9,000 km^2 (3%) of Romania are chemically polluted, and this includes 2,000 km^2 of extremely polluted land. Several studies conducted in the areas most polluted by metal smelters (Copsa Mica, Baia Mare, and Zlatna) in the early 1990s have shown significant levels of population exposure to toxic metals (Cd, Pb), and confirmed the adverse impact of the exposure on health. The exposure is not only related to waste management, but also to the entire process of production which does not take the prevention of environmental pollution into account in all its stages (Chapter 10).

A potential, but uninvestigated, health problem is the radioactive waste from uranium mining, phosphogypsum waste from fertilizer production and saline water contaminated with Rn226 from oil extraction.

Ionizing radiation

Indoor exposure to radon is another source of radiological risk besides the above-mentioned potential risk to health from waste contaminated by radioactive material. Several surveys measured indoor radon levels, but no systematic, countrywide investigations were conducted. Most of these measurements indicated rather low indoor Rn levels (up to 33 Bq/m^3). However, in the houses where phosphogypsum was used in building materials, Rn levels reached 145 Bq/m^3 (following these studies, the Ministry of Health imposed a radiation limit of 100 Bq/kG for all building materials). Occasional measurements in houses without cellars indicated levels of Rn exceeding the recommended action level several times (200 Bq/m^3). This suggests that the risk of high exposure to natural radon exists and should be considered in the construction of houses. Better identification of the risk areas requires a more systematic survey.

Present health and radiation monitoring around nuclear installations indicates no risk to the general population's health. The closing-down of several uranium mines, without adequate measures to prevent population exposure to radiation from mining wastes, constitutes a source of risk. Its magnitude has not, however, been investigated.

Food contamination

High levels of heavy metals (lead, cadmium and chrome) have been detected in various foods available on the market, such as milk, bread, potatoes, vegetables and fruit. There is no systematic information on the areas where the metals uptake is more or less likely, but it is certain that high levels of contamination are present close to metal-processing plants, such as those in Zlatna, Copsa Mica and Baia Mare.

Due to the ban on the use of chlorinated pesticides in agriculture starting in the mid-1980s, the levels

of food contamination with organo-chlorinated pesticides was low in the late 1990s, both in comparison with the maximum allowable levels and with the concentration of these chemicals in food in the late 1980s.

The levels of nitrates in food are considered to be low, although in 10-25% of milk samples the nitrate level does exceed the national standard of 70 µg/kg. This standard is, however, markedly lower than the one adopted in the EU countries. In other food products that might be contaminated, the mean levels are less than 50% of the maximum allowed levels.

Microbiological contamination of food is still a problem, with the registered number of food-borne infections remaining on a relatively constant level throughout the 1990s. In 1999, close to 3,800 cases of food-borne infections were registered, including 1,103 cases caused by salmonella. In about half the registered outbreaks, the food was prepared and consumed at home.

Workplace conditions

Exposure to hazardous substances at the workplace is quite common in Romania and causes substantial morbidity (Table 14.3). However, both the prevalence of the exposure to the main hazards and the incidence of occupational diseases were decreasing at the end of 1990s as compared with previous years. Exposure to silica dust and to lead above the threshold limit value (TLV) was almost twice as common in the early 1990s as at the end of the decade.

Conditions at the workplace are also a cause of accidents. Out of the 6,481 accidents affecting the health of workers registered in 1999, 431 were fatal. Both the incidence of accidents and the number of fatalities has decreased by 7%-17% in recent years.

14.3 Policy and management related to environmental impacts on public health

Legal instruments and institutional responsibilities

According to the Romanian Constitution of 1991 (art. 33(1)), the State is responsible for the health of the Romanian population. Therefore, environment action uses public health also as an important target.

Maintaining and improving public health and the quality of life is the first general principle of the Romanian Environmental Protection Strategy for 2000-2004. This principle is also the first of several determinants for priority actions regarding environmental recovery and protection.

The formal responsibility for public health, including environmental health, lies with the Ministry of Health (Law on Public Health Care, No. 100/1998). Public health care actions are carried out within the framework of 31 national programmes established by this Law. Programme No. 9 (PN9) is the National Programme on Environment and Health (NEHAP). It addresses institutional development, regulation, inter-sectoral

Table 14.3: Exposure to selected hazardous substances in the workplace, 1999

Persons

	Number exposed	Number exposed over TLV	Number of diagnosed cases of occupational disease
Silica dust	69,028	39,345	649
Lead	17,511	5,662	238
Mercury	1,539	196	0
Chromium	4,032	817	22
Organic solvents	60,843	8,158	22
Irritant gases	96,374	23,071	71
Noise and mechanical vibrations	187,876	67,720	492

Source: Institute of Public Health, Bucharest.

TLV: **T**hreshold **L**imit **V**alue

harmonization, monitoring and health impact assessment. In the year 2000, this programme had, for the first time, its own budget, allowing it to use national funds.

Within the PN9 framework, the County Directorates of Public Health in all 42 counties (one for each of the 41 districts and a separate one for Bucharest) carry out the activities at regional level. These activities include monitoring environmental hazards (air quality, water quality, food, housing, noise, waste, radiation and hygiene at the workplace) and issuing permits for all the activities with a potential health impact. Four Institutes of Public Health (in Bucharest, Iasi, Timisoara and Cluj) supervise the work of the Directorates and act as regional reference centres (with counties assigned to each of them).

At local level, according to Ministerial Order No. 330/1999, inspection is the responsibility of the Health Inspectorates. The obligations of the Inspectorates include suspending operations by units found to cause health risk or withdrawing health permits. One of the important tasks of the health inspection is the control of food safety. Its 80 laboratories analyse close to 80,000 food samples annually, following norms that are generally in line with the provisions of EC Directive No. 93/43/EC. The HACCP (hazard assessment critical control point) system was introduced in 1995 (Ministry of Health Order No. 956/1995). However, the system works only in a few enterprises, mainly due to frequent reorganizations in the industry.

The assessment and promotion of basic hygiene conditions, especially in rural areas, used to be the task of the health-care units responsible for the delivery of medical services and disease prevention among the population of a given catchment area. Disease clusters could be identified, and their possible link with environmental conditions could easily be assessed and mitigated. However, the recent reform of the health care system gives patients a free choice of physicians and requires registration with a chosen clinic. In the first year of the reform, a substantial part of the population had still not registered. The lack of strict territorial demarcation of catchment populations, though welcome from the patient's point of view, reduces the primary health-care provider's appreciation of responsibility for the assessment and mitigation of environmental health hazards.

The Ministry of Health has no specific unit responsible for environmental health issues. The Public Health Directorate of the Ministry uses the Institutes of Public Health as the resource for the issues affecting each of the four parts of the country coordinated by them. However, the Ministry has no capacity for the national analysis of the information that might support strategic decisions or discussions with the other sectors/ministries on the national level.

Environmental health action programmes

The National Environmental Health Action Plan (NEHAP) was prepared in 1997, and provided the basis for National Health Programme No. 9 (NP9) defined by the Law on Public Health Care. The definition of NEHAP, as well as the initial phases of its implementation, developed lines of communication between the health and environmental sectors. Several projects proposed by the NEHAP were included in the NEAP priority list. However, after the drafting of NEHAP the Inter-ministerial Steering Committee was abolished and merged into the national programmes of the Ministry of Health.

Due to the highly decentralized approach of public administration and the high degree of local autonomy, the implementation of the National Environmental Health Action Plan (NEHAP) goes through the Local Environmental Health Action Plans (LEHAP). There are, however, few examples of such local plans. The mobilization of human and financial resources requires that environmental health problems be clearly identified by the public and by the decision makers. This is still not the case in most of the country. To stimulate the interest of the local decision makers, the NEHAP secretariat, based in the Institute of Public Health in Bucharest, organized two workshops in 1998. Its primary objective included the promotion of collaboration between the local agencies of the Ministry of Health and the Ministry of Water, Forests and Environmental Protection so as to develop and implement the LEHAPs. In 1999, most of the districts were working on the preparation of their local action plans. The main obstacle identified in the planning phase, besides the lack of financial resources, was the lack of communication among the professionals, between the professionals and the public and the decision makers in various sectors. The NEHAP secretariat therefore prepared relevant training materials and organized training courses.

The outline of the LEHAPs was to be defined by the end of 2000. Therefore no assessment of the range and extent of local action was available for

the present review. However, the frequent reorganizations of the administration, both national and local, have undoubtedly affected the effectiveness of the NEHAP implementation and the preparation of the local action plans.

A serious limitation of the decentralized approach is the lack of strong sectoral action plans, or plans regarding certain priority issues affecting a large part of the country. For instance, there is no comprehensive, systematic approach to the promotion of sanitation in the rural areas. Another example is the lack of assessment of the public health risk related to the accumulated industrial wastes.

Monitoring and reporting on environmental health

As mentioned above, the monitoring of environmental health hazards is the responsibility of the County Directorates of Public Health. Most of the information they collect is submitted to the Institute of Public Health in Bucharest for nationwide analysis. The Institute produces annual national reports (e.g. on occupational health, food safety, ambient air quality or noise effects), which are made publicly available. However, the national analysis of drinking-water quality has not been published since 1995. This is the result of incomplete reporting of data to the national level (only some 60% of data were reported) as well as insufficient capacity to process the large quantity of collected information. Consequently, the information from monitoring, in which close to 370,000 water samples are analysed annually in 147 cities (out of 263), is not published and is not readily available at national level (though it might be available locally). The uncertain future role of the air quality monitoring performed by the public health system as well as the lack of nationwide coordination and quality control also affect the intensity of monitoring and data quality.

It is expected that Ordinance No. 768 of the Ministry of Health, issued in September 2000, will correct this situation and allow the Ministries, and the public, to have a national overview of all important environmental health aspects. This Ordinance follows the provision of the Law on Public Health Care (100/1998) assigning the task of organizing the information system of the public health care system and should facilitate the implementation of the obligations required under the Aarhus Convention.

The Statistical Centre of the Ministry of Health is responsible for reporting and analysing health data. The analysis covers the (cause-specific) mortality and incidence of several notifiable diseases. The Centre publishes annual and quarterly analytical reports, giving a good overview of the temporal and spatial (district-specific) pattern in the health status of the population. Recently, district data has also been mapped with a computer-mapping programme. Independently, the Ministry of Health maintains a system for direct reporting of the incidence of communicable diseases, allowing for rapid epidemiological management. The system, however, does not address the link between health and environmental data, e.g. it is not possible to estimate the location, number and extent of water-borne disease outbreaks.

The Bucharest Institute of Public Health is responsible for registering occupational diseases and analysing their outbreaks.

14.4 Conclusions and recommendations

According to several indicators, the health of the Romanian population is poorer than in most of central and eastern Europe, and markedly below that observed in the EU. Although a combination of social, economic and health-care factors determine this poor health, environmental and hygiene conditions might play a role in the high infant mortality, the incidence of digestive system diseases or tuberculosis. Poor access to safe drinking water and safe food contributes to a high incidence of viral hepatitis, diarrhoeal diseases and food-borne infections. The trends of most indicators do not reflect a deterioration, but they also do not show any significant improvement over the past years.

The most prominent health risk factor is the poor quality of drinking water in rural areas. Frequent interruptions in the water supply and leaks cause health risks due to secondary contamination in cities too. Microbiological contamination of the water is the most likely risk factor, although the incompleteness of data and difficult access to information from recent years prevent a precise nationwide assessment of spatial distribution and present temporal trends in population exposure. The high level of registered morbidity due to diseases that may be transmitted through water suggests that the hazard still exists.

Recommendation 14.1:
The comprehensive programme contained in the NEHAP to improve the availability and quality of drinking water should be implemented jointly by the Ministry of Health and the Family and the Ministry of Waters and Environmental Protection. The aim should be to protect drinking-water sources from contamination (mainly in rural areas), improve the safety and reliability of water distribution systems (mainly in cities), and increase the access of the rural population to piped water from safe sources.

Recommendation 14.2:
The Ministry of Health and the Family and the Ministry of Waters and Environmental Protection should jointly improve information on the availability and quality of drinking water from the water monitoring system as well as from the registration of (possible) water-borne disease outbreaks and ensure that it is complete and accessible. This information is necessary, both at local and at national levels, to stimulate, guide and evaluate the effectiveness of investments in water-processing and supply systems. See also Recommendation 1.4.

The pollution of ambient air with suspended particulate matter is high in Romanian cities and can lead to a range of adverse effects, such as respiratory and cardiovascular morbidity, as well as increases in the risk of premature death. High levels of NO_2, associated with particulate pollution, indicate that transport is the main source of urban pollution. The poor technical condition of the cars, the poor quality of the fuel and the lack of effective emission control, combined with the increase in traffic, will continue to be a threat to the health of the urban population. Energy production, using poor-quality fuel oil, contributes to the problem in some cities. Urban residents living close to busy roads are also heavily exposed to outdoor air pollutants when they are indoors.

Recommendation 14.3:
Action to reduce urban air pollution from particulate matter should focus on road transport, as well as on specific industrial pollution sources. Related information should be disclosed by the Ministries of Health and the Family, of Waters and Environmental Protection and of Public Works, Transport and Housing to the public and the need to prevent exposure explained, as it may help reduce the health impact on the most vulnerable individuals.

An improvement in the monitoring of air pollution, and in the dissemination and use of the information generated by monitoring will be necessary for effective action. This issue is assessed in Chapter 6 and gives rise to Recommendation 6.3.

Recommendation 14.4:
PM10 (and PM2.5) should be monitored where needed as they have potential adverse health effects.

Some areas of the country are still highly polluted, mostly as a result of past industrial and mining activities. Public health and environmental interventions in Zlatna during 1994-1997, through a community intervention programme with USAID support, led to a significant decrease in the number of people (especially children) heavily exposed to lead. This was achieved through a cross-sectoral collaborative strategy that led to a series of measures: extensive blood lead testing of children and workers, changes in the behaviour of the community, collaborative community efforts to improve kindergarten hygiene, the improvement of air monitoring and data management, the installation and maintenance of an air quality monitoring system, the improvement of occupational health and safety at the factory, as well as the development of a local NGO. In other places that had similar exposure levels in the past, such as Baia Mare or Copsa-Mica, no similar programmes were implemented.

Recommendation 14.5:
The Ministry of Health and the Family should assess the population's exposure to lead in highly polluted regions in order to determine if the information provided to the public and to decision makers in the early and mid-1990s has been efficiently used. If exposure levels are still above the acceptable limits, action should be taken to further reduce population exposure. Such action should include a cut in emissions of lead to the atmosphere, changes in the behaviour of the residents of the contaminated areas, and recultivation of the contaminated land to avoid resuspension of the pollution.

Accumulated industrial waste creates a potential, though not well recognized or inventoried, risk to public health, due to the possibility of accidental contamination of the environmental media, e.g. rivers, or as a result of long-term emission of hazardous materials to air and water (surface and ground). The wastes create chemical and radiological risks.

Recommendation 14.6:
The Ministry of Industry and Mineral Resources in cooperation with the Ministry of Waters and Environmental Protection should inventory existing (industrial) waste sites and the Ministry of Health and the Family should assess the public health risk. This assessment should be a basis for action to manage the wastes guided by the priority of protecting public health.

Occupational health services have focused until now on the traditional occupational medicine approach. Expansion of this task to include broader concerns of health, environment and safety management at the enterprise (HESME) would be beneficial for the environment, and would effectively use the professional resources of occupational health staff.

Recommendation 14.7:
Occupational health services should adopt the health, environment and safety management at the enterprise (HESME) approach to better integrate the concerns for the health of workers, local residents and the environment.

The National Programme No. 9, based on the NEHAP, created a strategic framework for nationwide action on environmental health. Decentralization of responsibilities for local problems calls for local plans as the way to improve environmental conditions and to prevent the population's exposure to environmental health hazards.

Recommendation 14.8:
Under the responsibility of the Ministry of Health and the Family, LEHAPs (Local Environmental Health Action Plans) should be developed urgently, giving sufficient funding and staff to the local administration responsible for their preparation and implementation. Tools and methods for local actions under the NEHAP should be prepared. The NEHAP secretariat should be responsible for describing the LEHAP situation and publicizing the results of local experiences.

The existing legislation and organization of the administration in the country assigns the leading role in protecting public health to the Ministry of Health and its subordinate institutions. The Institutes of Public Health play a specific role in this system, as centres of methodological excellence, professional support and scientific resource for decision-making. However, many actions necessary for improving health and living conditions also require the involvement of other sectors, including the economy, industry, transport, housing and environmental protection. There is also an increased role for the public in the determination of environmental health conditions and actions. Good communication is a prerequisite for the involvement of all the stakeholders and for effective measures.

To strategically plan and implement the measures, the health, environment and economic sectors should seek closer contact and intensify their cooperation. Their agencies that perform similar tasks (e.g. generating information on population exposure to environmental hazards) should harmonize their work and optimize the use of their resources. See Recommendation 1.3 in Chapter 1.

Recommendation 14.9:
The Government should ensure that the expertise and resources of the Institutes of Public Health are strengthened and used (i) to assess the health impact of existing environmental conditions and of implemented, or planned, actions and policies, which should be part of any planning process, and (ii) to communicate the results to the public. An efficient information system with data on environmental health hazards, on population exposure and on local projects, should be established. It will help set local and national priorities.

ANNEXES

ANNEX I
SELECTED ECONOMIC AND ENVIRONMENTAL DATA

Selected economic data

	Romania
TOTAL AREA including water *(1 000 km²)*	238.39
POPULATION	
Total population, **1999** *(100 000 inh.)*	224.58
- % change (**1994-1999**)	-1.20
Population density, **1999** *(inh./km²)*	94.21
GROSS DOMESTIC PRODUCT	
GDP, **1999** *(US$ billion)*	34.03
- % change (**1994-1999**)	13.09
per capita, **1999** *(US$ per capita)*	1515.14
INDUSTRY	
Value added in industry, **1999** *(% of GDP)*	31.00
Industrial output	
- % change **(1994-1999)**	-13.56
AGRICULTURE	
Value added in agriculture, **1999** *(% of GDP)*	15.40
Agricultural output	
- % change (**1994-1998**)	11.80
ENERGY CONSUMPTION	
Total consumption, **1998** *(Mtoe)*	36.75
- % change (**1993-1998**)	-10.00
Energy intensity **1998** *(toe/ US$ 1 000)*	1.32
- % improvement (**199.-199.**)	…
Structure of energy consumption, **1998** *(%)*	
- Coal	19.50
- Oil and oil products	28.31
- Gas	37.06
- Others	15.14
ROAD TRANSPORT	
Road traffic volumes, **199.**	
- million veh.-km	
- % change (**199.-199.**)	…
- per capita *(1 000 veh.-km/inh.)*	…
Road vehicle stock, **1998**	
- 10 000 vehicles	413.90
- % change (**1993-1998**)	44.47
- private cars per capita **1998** *(veh./1 000 inh.)*	125.66

Sources: Romania and UNECE.

Selected environmental data

	Romania
LAND	
Total area **1998** *(1 000 km^2)*	229.59
Protected areas **199.** *(% of total area)*	4.8
Nitrogenous fertilizer use, **1999** *(ton/km^2 arable land)*	1.61
FOREST	
Forest area *(% of land area)*	28
Use of forest resources (harvest/growth) *%* **199.**	…
Tropical wood imports *(US$/inh.)*	…
THREATENED SPECIES	
Mammals *(% of known species)*	2.0
Birds *(% of known species)*	1.7
Freshwater Fish *(% of known species)*	4.7
WATER	
Water withdrawal *(% of gross annual availability)* **1999**	4.0
Fish catches *(tons)* **1997**	19322
Public waste water treatment *(% of population served)* **199.**	…
AIR	
Emissions of sulphur oxides, **1997** *(kg/inh.)*	40.0
Emissions of sulphur oxides, **1997** *(kg/US$ 1 000 GDP)*	25.5
Emissions of nitrogen oxides, **1997** *(kg/inh.)*	14.7
Emissions of nitrogen oxides, **1997** *(kg/US$ 1 000 GDP)*	9.4
Emissions of carbon dioxide, **1997** *(ton/inh.)*	4.7
Emissions of carbon dioxide, **1997** *(ton/US$ 1 000 GDP)*	3.0
WASTE GENERATED	
Industrial waste *(kg/US$ 1 000 GDP)* **1999**	988.0
Municipal waste *(kg/inh./day)* **1999**	0.8
Nuclear waste *(tons)* **199.**	…
NOISE	
Population exposed to leq > 65 dB (A) *(million inh.)* **199.**	…

Sources: Romania and UNECE.

ANNEX II
SELECTED MULTILATERAL, REGIONAL AND SUBREGIONAL AGREEMENTS

	Worldwide agreements		Romania
	as of October 2001		
1949	(GENEVA) Convention on Road Traffic	**y**	**R**
1957	(BRUSSELS) International Convention on Limitation of Liability of Owners of Sea-going Ships	**y**	
1958	(GENEVA) Convention on Fishing and Conservation of Living Resources of the High Seas	**y**	
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	**y**	**R**
1969	(BRUSSELS) Convention on Civil Liability for Oil Pollution Damage	**y**	
	1976 (LONDON) Protocol	**y**	
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualities	**y**	
1971	(RAMSAR) Convention on Wetlands of International Importance especially as Waterfowl Habitat	**y**	**R**
	1982 (PARIS) Amendment	**y**	**R**
	1987 (REGINA) Amendments	**y**	
1971	(GENEVA) Convention on Protection against Hazards from Benzene (ILO 136)	**y**	
1971	(BRUSSELS) Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	**y**	
1972	(PARIS) Convention on the Protection of the World Cultural and Natural Heritage	**y**	**R**
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	**y**	
1973	(WASHINGTON) Convention on International Trade Endangered Species of Wild Fauna and Flora	**y**	**R**
	1983 (GABORONE) Amendment		
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)	**y**	**R**
	1978 (LONDON) Protocol (segregated balast)	**y**	**R**
	1978 (LONDON) Annex III on Hazardous Substances carried in packaged form	**y**	
	1978 (LONDON) Annex IV on Sewage	**y**	
	1978 (LONDON) Annex V on Garbage	**y**	**R**
1974	(GENEVA) Convention on Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (ILO 139)	**y**	
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration (ILO 148)	**y**	
1979	(BONN) Convention on the Conservation Migratory Species of Wild Animals	**y**	**R**
	1991(LONDON) Agreement Conservation of Bats in Europe	**y**	**R**
	1995 (THE HAGUE) African/Eurasian Migratory Waterbird Agreement (AEWA, 1995)		
	1996 (MONACO) Agreement ACCOBAMS		
1982	(MONTEGO BAY) Convention on the Law of the Sea	**y**	**R**
1985	(VIENNA) Convention for the Protection of the Ozone Layer	**y**	**R**
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	**y**	**R**
	1990 (LONDON) Amendment to Protocol	**y**	**R**
	1992 (COPENHAGEN) Amendment to Protocol	**y**	**S**
	1997 (MONTREAL) Amendment to Protocol		**S**
1986	(VIENNA) Convention on Early Notification of a Nuclear Accidents	**y**	**R**
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	**y**	**R**
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	**y**	**R**
	1995 Ban Amendment		
	1999 Protocol of Liability and Compensation		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation	**y**	**R**
1992	(RIO) Convention on Biological Diversity	**y**	**R**
	2000 (CARTAGENA) Biosafety Protocol		**S**
1992	(NEW YORK) Framework Convention on Climate Change	**y**	**R**
	1997 (KYOTO) Protocol		**S**
1994	(VIENNA) Convention on Nuclear Safety		**R**
1994	(PARIS) Convention to Combat Desertification	**y**	**R**
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Hazardous Chemicals and Pesticides in International Trade		

Source: UNECE and Romania.

y = in force; **S** = signed; **R** = ratified.

Selected bilateral and multilateral agreements *(continued)*

	Regional and subregional agreements		Romania
	as of October 2001		
1950	(PARIS) International Convention for the Protection of Birds	**y**	
1957	(GENEVA) European Agreement - International Carriage of Dangerous Goods by Road (ADR)	**y**	**R**
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts.	**y**	**R**
1968	(PARIS) European Convention - Protection of Animals during International Transport	**y**	**R**
	1979 (STRASBOURG) Additional Protocol	**y**	**R**
1969	(LONDON) European Convention - Protection of the Archeological Heritage	**y**	**R**
1979	(BERN) Convention - Conservation European Wildlife & Natural Habitats	**y**	**R**
1979	(GENEVA) Convention - Long-range Transboundary Air Pollution	**y**	**R**
	1984 (GENEVA) Protocol - Financing of Co-operative Programme (EMEP)	**y**	
	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	**y**	
	1994 (OSLO) Protocol - Further Reduction of Sulphur Emissions	**y**	
	1998 (AARHUS) Protocol on Heavy Metals		**S**
	1998 (AARHUS) Protocol on Persistent Organic Pollutants		**S**
	1999 (GOTHENBURG) Protocol to Abate Acidification, Eutrophication and Ground-level Ozone		**S**
1991	(ESPOO) Convention - Environmental Impact Assessment in a Transboundary Context	**y**	**S**
1992	(HELSINKI) Convention - Protection and Use of Transboundary Waters and International Lakes	**y**	**R**
	1999 (LONDON) Protocol for Waters and Health		**S**
1992	(HELSINKI) Convention - Transboundary Effects of Industrial Accidents		
1992	(BUCHAREST) Convention - Protection Black Sea Against Pollution	**y**	**R**
1993	(LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(LISBON) Energy Charter Treaty		**R**
	1994 (LISBON) Protocol on Energy Efficiency and Related Aspects		**R**
1994	(SOFIA) Convention on Cooperation for the Protection and Sustainable Use of the Danuble River	**y**	**R**
1998	(AARHUS) Convention On Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters		**R**

Source: UNECE and Romania.

y = in force; **S** = signed; **R** = ratified.

SOURCES

Personal Authors

1. Ansart Céline et al. Quel est le potentiel céréalier des pays de l'Est? Perspectives agricoles 177, février 1993.
2. Krystel. S'installer dans le tourisme vert. Editions du puits fleuri. 1998.
3. Cosinschi Micheline. Maillages géographiques de la Roumanie. Projet No 71P 51744,1998. Institut de géographie de l'Université de Lausanne, Suisse.
4. de Nève, D. "Wirtschaftspolitik in Rumanien Das Reformprogramm der Regierung Victor Ciorbeas". Osteuropa. Volume 8-9, August-September 1998.
5. Falkenhagen, H. J. "Chronik der Rechtsentwicklung: Rumanien". Recht in ost und west. No 9, December 1997.
6. Jones, C. "Rumbles felt in Romania". The Banker. June 1997, pp. 41-44.
7. Junior R. Davis & Gaburici Angela. Rural Finance and Private Farming in Romania. Europe-Asia studies, 51/5, 1999, 843-869.
8. Linkee B. et al. Aufbereitung von Gülle aus Massentierhaltungen. Korrespondenz Abwasser 3/91 38. Jahrgang, 394-401.
9. Lorber, K., and Erhart-Schippek, W. Aurul Dam, Baia Mare and Novat Dam, Baia Borsa, Maramures County, Romania. May 2000. Report for WWF Danube Carpathian Programme Office.
10. Mappes-Niediek, N. "Von Albanien nach Rumanien, Unruhen und Umbruche in Sudosteuropa", Blatter fur deutsche und internationale Politik, April 1997, pp. 472-480.
11. Sperneac-Wolfer, C. "Das rumänische Erdölgesetz, Investitionen auf Konyessionsbasis in Rumänien". RIW. Volume 5, 1998.
12. Tontsch, G., "Der verlorene Sohn: Moldova und Rumanien". Sudosteuropa Mitteilungen, No 4, 1996, pp. 336-343.

National material

13. A Green Corridor for the Danube. Ministries of Environment of Bulgaria, Moldova, Romania and Ukraine / WWF. 2000.
14. Annual Report on Environmental Radioactivity Surveillance in Romania. National Commission for Nuclear Activities Control. 1999.
15. Annuarul Statistic al Romaniei.1998.
16. Sinteza anuala privind protectia calitatii apelor in Bazinul hidrografic Bega-Timis-Caras. Apele Romane. 1999.
17. Approximation. Industrial Pollution Control Sector. Baseline study. Romania. August 1999.
18. Approximation. Industrial Pollution Control Sector. Preview of Directives. Romania. August 1999.
19. Background Documentation on the National Environment Action Plan. Ministry of Waters, Forests and Environmental Protection/General Directorate for European Integration, International Programs, Projects and Relations. 1998.
20. Indrumator pentru agricultura ecologica. Conditiile de atestare a produselor ecologice. OGR nr.34/2000. Bioterra Romania.
21. Business opportunities in Romania's agriculture. Ministry of Agriculture and Food. Bucharest, 1998.
22. Code forestier 93/1996.
23. Compania Nationala "Apele Romane". Prospectus.
24. Compendium of Environmental Data, Romania. National Commission for Statistics in Romania. 1999.
25. Decree No 340 on costs of services and procedures for local environmental protection agencies. Ministry of Waters, Forests and Environmental Protection. Bucharest, March 2000.
26. Ecological restoration in the Danube Delta Biosphere Reserve/Romania. Ministry of Waters, Forests and Environmental Protection/Danube Delta Biosphere Reserve Authority/Danube Delta Research and Design Institute / WWF. 1997.
27. Energy and Environment. Ministry of Waters, Forests and Environmental Protection. 24 July 2000.
28. Environment protection law. Law 137/30.XII.1995.
29. Environment Protection Strategy 2000-2004. Ministry of Water, Forest and Environmental Protection. Bucharest, 2000.
30. Environment Protection Strategy. Ministry of Water, Forest and Environmental Protection. Bucharest, 1996.
31. Environment protection strategy. Phare. Bucharest, 1996.
32. Focus Agriculture. Le gouvernement de la Roumanie, le département des informations publiques.
33. General Information for Presentations. The National Office of Cadastre, Geodesy and Cartography (NOCGC). Bucharest, 2000.
34. Guide Book for The Mayors and the Local Councillors: How to apply the law no. 50/1991 (Urban and Regional Planning Series). Ministry of Public Works and Regional Planning. Bucharest, July 1993.
35. Hotarare privind masuri de protectie a calitatii resurselor de apa 472/2000. Romanian Parliament.
36. International Cooperation. Prepared by the Ministry of Waters, Forests and Environmental Protection for the EPR Review, July 2000.
37. Irrigation and drainage in Romania. Ten year development program. Ministry of Agriculture and Food. 1994.
38. Law on hunting fund and protection of game no. 103/23.09.1996 (publ.OG no.235/27.09.1996).
39. Law on the environmental protection no.137/29.12.1995 (publ.OG no.304/30.12.1995).

40. Lege privind unele masuri pentru ameliorarea prin impadurire a terenurilor degradate 107/1999. Romanian Parliament.
41. Legislatia din domeniul protectiei plantelor si carantiniei fitosanitare in Romania (pesticide).
42. Media Globe Invest. Invest Romania, independent business quarterly. No 6, Bucharest, winter 1997/1998.
43. Ministerial Order no.125/1996 permitting procedure for economic and social activities having an environmental impact according to the Environmental Protection Law no. 137/1995.
44. Ministerial Order no.184/1997 for the approval of the Environmental Audit Completion Procedure.
45. Buletin Informativ privind situatia calitatii mediului in judetul TULCEA in perioada 1-30 Septembrie 2000. Ministerul Apelor, Padurilor si Protectiei Mediului/Agentia de Protectie a Mediului Tulcea. Octombrie 2000.
46. National Environmental Action Plan 1999-2000, Ministry of Water, Forest and Environmental Protection. 1999.
47. National Plan for Environment – ISPA Implementation. Government of Romania. 2000.
48. National Programme for Territorial Planning. Ministry of Public Works and Territorial Planning. Bucharest. 2000 (latest draft update).
49. National Report on the implementation of the UNCCD in Romania. Ministry of Water, Forest and Environmental Protection. Bucharest, 2000.
50. National Sustainable Development Strategy. Ministry of Water, Forest and Environmental Protection. Bucharest, 1999.
51. News Bulletin. Ministry of Agriculture and Food. General Division for the integration of agrofood strategies and policies. Number 8 – 2000.
52. Ordinanta privind unele masuri pentru ameliorarea prin impadurire a terenurilor degradate 81/1998.
53. Overview regarding the water sector in Romania. Background information. Ministry of Water, Forest and Environmental Protection.
54. Panorama Roumain. The Foreign Languages Press Group “Romania”. Bucharest, 67-68/1997.
55. Public Awareness Strategy. Ministry of Waters, Forests and Environmental Protection/Danube Delta Biosphere Reserve Authority. Tulcea, Romania, June 1990.
56. Raportarea activitatii de inspectie pe anul 1999 (Danube Delta).
57. Reforma si lucrarile publice in Romania ultimilor ani 1997-2000. Ministerul Lucrarilor Publice si Amenajarii Teritoriului. Bucuresti, 2000.
58. Report on Nature and Biodiversity Management. Background information. Ministry of Water, Forest and Environmental Protection. September 2000.
59. Romania, Romanian economy. No 13, Editions DACIA France. Bucharest, January-April 1998.
60. Romanian Panorama. The Foreign Languages Press Group “Romania”. Bucharest, 73-74/1997.
61. Romanian Statistical Yearbook. National Commission for Statistics in Romania. 1999.
62. Romsuintest Peris. Prospectus.
63. Sectoral Approximation Strategy for Air and Climate Change in Romania. Government of Romania. September 1999.
64. Situatia Actelor Normative promovate in perioada 1998-2000, Ministerul Apelor, Padurilor si Protectiei Mediului , Directia de Strategii, Politici si Legislatie, 13.07.2000.
65. State of the Environment Report 1999. Ministry of Water, Forest and Environmental Protection. Romania, May 2000.
66. Statistical Year Book of Romania, 1999.
67. Strategia Nationala si Planul de Actiune pentru conservarea biodiversitatii si utilizarea durabila a componentelor sale. Sectiunea III. Ecosistemele arabile.
68. Strategia Proctectiei Mediului pe termen mediu 2000-2004. Ministry of Water, Forest and Environmental Protection Ministry of Water, Forest and Environmental Protection.
69. The Forest Code no. 26/24.04.1996 (publ.OG no.93/8.05.1996).
70. The National Medium-Term Development Strategy of the Romanian Economy. Government of Romania, March 2000.
71. The sheets of the National Office of Cadastre, Geodesy and Cartography (NOCGC), presented at the International Conference of the Development and Maintenance of Property Rights. Vienna, May 1999.
72. Urban Project, “Public Relations Brochure”, Bucharest.
73. Urban Project, Spatial Planning and Regional Development, Romania, 1999.
74. Urgency Ordinance on the agri-foodstuffs 34/2000.
75. Water Law (10/1996).
76. Water Law no.107/25.09.1996 (publ.OG no.244/8.10.1996).

Regional and international organizations and institutions

77. “Chronik der Rechtsentwicklung: Rumanien”. Recht in Ost und West. No 5, May 1998.
78. “EBRD Case Study: Thermal Energy Conservation Project, Romania”. Task Force for the Implementation of the Environmental Action Programme for Central and Eastern Europe. Project Preparation Committee (PPC/TF (97) 4), European Bank for Reconstruction and Development. January 1997.
79. “Romania”. East European Constitutional Review. Volume 7, No 3, 1998.
80. Accession Partnership 1999, Romania. European Commission. 1999.
81. Agricultural pollution control project. Romania. GEF-Project.
82. Agricultural Situation & Prospects in the Central & Eastern European Countries: Romania, European Commission-DG VI, May 1995.
83. Agricultural situation and prospects in the Central European countries. Romania. European Commission Directorate General for Agriculture (DG VI). May 1998.
84. Assessment Mission: Cyanide Spill at Baia Mare, Romania. UNEP/OCHA. March 2000.
85. Centre pour la coopération avec les pays non-membres. Politiques agricoles: économies émergentes et pays en transition. OCDE. 1999.

86. Centre pour la coopération avec les pays non-membres. Regards sur l'agriculture dans les économies émergentes et les pays en transition. OCDE. 1999.
87. Danube partnership program. National projects investment portfolio. Project concepts. Status 6 July 1999.
88. Danube Pollution Reduction Programme. National Planning Workshop Romania MWFEP and UNDP/GEF. October 1998.
89. Danube Pollution Reduction Programme. Technical reports. MWFEP and UNDP/GEF. October 1998.
90. Environmental Impacts of Trade Liberalization and Policies for the Sustainable Management of Natural Resources, A case study on Romania's water sector, UNEP, 1999.
91. Environmental performance review programme. Environmental management in transition: problems, approaches, results, needs. UN/ECE. Geneva, August 2000.
92. EU Approximation Process Report, 1998, Annex IX, Status Report for Romania.
93. Europe centrale et orientale 1991: Bulgarie, Pologne, Roumanie, Union Sovietique, Tchecoslovaquie, Hongrie, dans la serie: "Monographies Pays", Eurostat, 1991.
94. Examen des politiques agricoles. Roumanie. 2000. Annexe I. Performances environnementales de l'agriculture roumaine pendant la phase de transition. – sélection d'indicateurs de l'environnement. OECD.
95. Forest and Forest Products Country Profile: "Romania", UN-ECE/FAO, New York 1992.
96. Industrial Pollution Control Sector, Approximation Plan, COWI and Carl Bro International, August 1999.
97. L'Etat du Monde, 2000. Editions la Découverte & Syros, Paris, 1999.
98. Länderbericht Rumänien. Statistisches Bundesamt. Wiesbaden, 1995.
99. National Human Development. Report Romania 1999, UNDP. Bucharest, 1999.
100. National Plan for agriculture and rural development, over the 2000-2006 period. Under the EU special accession program for agriculture and rural development (SAPARD). October 10th 2000.
101. PHARE TA Romania on environment statistics, Report of a mission to Bucharest by Ulrich Wieland (Eurostat/F3) and Léon Tromp (Netherlands Statistics), Bucharest, 15 - 16 April 1999.
102. Project "Coordination of Environment Emergency Measures in Romania" after the Accidental Spills, 4th Report. UNDP. (6 June 2000).
103. Project Report: "Coordination of Environment Emergency Measures in Romania after the Accidental Spills", 4 reports, UNDP. March-June 2000.
104. Rapport régulier de la commission sur les progrès réalisés par la Roumanie sur la voie del'adhésion. Union Européenne. 8 novembre 2000.
105. Red Tape Analysis (Regulations and Bureaucracy in Romania). USAID. Bucharest, May 2000.
106. Regards sur l'agriculture dans les économies émergentes et les pays en transition, volume 1 pp 153-177 et volume 2 pp 91-96. OECD-CCET. Paris, 1999.
107. Regional Inventory of Potential Accidental Risk Spots in the Tisa catchment of Romania, Hungary, Ukraine and Slovakia. ICPRD. August 2000.
108. Situation of the EU approximation process, Legislative harmonisation 2000-2003, Part 3 on Environmental Protection, 1999.
109. Situation of the EU approximation process, Legislative harmonisation 2000-2003, Annex 3, Environmental Protection, 1999.
110. The Regional Environmental Center for Central and Eastern Europe. The Emerging Environmental Market. A Survey in Bulgaria, Croatia, Romania and Slovenia. (ISBN: 963 8454 48 2), Szentendre, Hungary, September 1997.

Websites

111. A green corridor for the Danube. WWF and Ramsar. www.panda.org
112. Abstract of the State of the Environment Report figures: www.mappm.ro/infopresa/communicate
113. ANTREC. Rural tourism. Prospectus. www.antrec.ro
114. Baia Mare EPA website. http://www.apmbm.ro/
115. Cemagref. www.cemagref.fr
116. Esmeralda Exploration website. http://www.esmeralda.com.au/
117. National Strategy and action plan for the biological diversity conservation and sustainable use of its components. July 1996. www.biodiversity.mppam.strategy.
118. Parliament of Romania, Chamber of Deputies, Law no. 151/1998 on Regional Development in Romania. http://www.cdep.ro/dic/owa/cd.home2
119. SIGMA (Support for Improvement in Governance and Management in Central and Eastern European Countries), Romania: Executive Authority, at http://www.oecd.org/puma/sigmaweb/index.htm
120. TER. Environmental Protection Association. www.ter.ro
121. The 1998 version of the State of the Environment Report. www.grida.no,
122. The Department of European Integration (DEI), Romania and the European Integration. http://servernt1.exec.gov.ro/die/en/702eng.htm - I1
123. The magazine "Perspective" and other information from NGOs. www.ong.ro
124. The Mineral Industry of Romania, 1997. Walter G. Steblez. http://www.worldbank.org/
125. The World Bank Group Countries: Romania. http://www.worldbank.org/
126. United States Energy Information Administration - Romania, http://www.eiadoe.gov/emeu/cabs/romania.html