DANUBE POLLUTION REDUCTION PROGRAMME

NATIONAL REVIEWS 1998
ROMANIA

TECHNICAL REPORTS

Part A: Social and Economic Analysis

Part B: Financing Mechanisms

MINISTRY OF WATERS, FOREST AND ENVIRONMENTAL PROTECTION

in cooperation with the

Programme Coordination Unit
UNDP/GEF Assistance

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Preface

The National Reviews were designed to produce basic data and information for the elaboration of the Pollution Reduction Programme (PRP), the Transboundary Analysis and the revision of the Strategic Action Plan of the International Commission for the Protection of the Danube River (ICPDR). Particular attention was also given to collect data and information for specific purposes concerning the development of the Danube Water Quality Model, the identification and evaluation of hot spots, the analysis of social and economic factors, the preparation of an investment portfolio and the development of financing mechanisms for the implementation of the ICPDR Action Plan.

For the elaboration of the National Reviews, a team of national experts was recruited in each of the participating countries for a period of one to four months covering the following positions:

- Socio-economist with knowledge in population studies,
- Financial expert (preferably from the Ministry of Finance),
- Water Quality Data expert/information specialist,
- Water Engineering expert with knowledge in project development.

Each of the experts had to organize his or her work under the supervision of the respective Country Programme Coordinator and with the guidance of a team of International Consultants. The tasks were laid out in specific Terms of Reference.

At a Regional Workshop in Budapest from 27 to 29 January 1998, the national teams and the group of international consultants discussed in detail the methodological approach and the content of the National Reviews to assure coherence of results. Practical work at the national level started in March/April 1998 and results were submitted between May and October 1998. After revision by the international expert team, the different reports have been finalized and are now presented in the following volumes:

Volume 1:	Summary Report
Volume 2:	Project Files
Volume 3 and 4:	Technical reports containing: - Part A : Social and Economic Analysis - Part B : Financing Mechanisms - Part C : Water Quality - Part D : Water Environmental Engineering

In the frame of national planning activities of the Pollution Reduction Programme, the results of the National Reviews provided adequate documentation for the conducting of National Planning Workshops and actually constitute a base of information for the national planning and decision making process.

Further, the basic data, as collected and analyzed in the frame of the National Reviews, will be compiled and integrated into the ICPDR Information System, which should be operational by the end of 1999. This will improve the ability to further update and access National Reviews data which are expected to be collected periodically by the participating countries, thereby constituting a consistently updated planning and decision making tool for the ICPDR.

UNDP/GEF provided technical and financial support to elaborate the National Reviews. Governments of participating Countries in the Danube River basin have actively participated with professional expertise, compiling and analyzing essential data and information, and by providing financial contributions to reach the achieved results.

The National Reviews Reports were prepared under the guidance of the UNDP/GEF team of experts and consultants of the Danube Programme Coordination Unit (DPCU) in Vienna, Austria. The conceptual preparation and organization of activities was carried out by **Mr. Joachim Bendow**, UNDP/GEF Project Manager, and special tasks were assigned to the following staff members:

- Social and Economic Analysis and Financing Mechanisms: **Reinhard Wanninger**, Consultant
- Water Quality Data: **Donald Graybill**, Consultant,
- Water Engineering and Project Files: **Rolf Niemeyer**, Consultant
- Coordination and follow up: **Andy Garner**, UNDP/GEF Environmental Specialist

The **Romanian National Reviews** were prepared under the supervision of the Country Programme Coordinator, **Mr. Octavian Ceachir**. The authors of the respective parts of the report are:

- Part A: Social and Economic Analysis: **Ms. Mihaela Popovici**
- Part B: Financing Mechanisms: **Ms. C. Rosu and Ms. Manea**
- Part C: Water Quality: **Mr. Liviu Popescu**
- Part D: Water Environmental Engineering: **Mr. Petru Serban**

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Vienna – Austria, November 1998

Part A

Social and Economic Analysis in Relation to Impact of Water Pollution

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List of Abbreviations
on Social and Economic Aspects

BAT	Best Available Technology
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BOD	Biochemical oxygen demand
CCA	Common Country Assessment
DDBR	Danube Delta Biosphere Reserve
DRPC	Danube River Protection Convention
EIA	Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
ECU	European Currency Unit
EU	European Union
GDP	Gross Domestic Product
GNP	Gross National Product
IMF	International Monetary Fund
MAF	Ministry of Agriculture and Food Industry
MOH	Ministry of Health
MWFEP	Ministry of Forest, Water and Environmental Protection
NCS	National Commission for Statistics
NGO	Non-govenmental Organization
PHARE	Poland, Hungary, Assistance for Economic Reconstruction
PCU	Programme Coordination Unit for Danube
SAP	Strategic Action Plan
SIP	Strategic Implementation Plan
TOR	Terms of References
TOC	Total organic carbon
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WHO	World Health Organization

Glossary
on Social and Economic Aspects

For the interpretation of the present report, the terms listed below shall mean:

Cost recovery	Fee structures that cover the cost of providing the service.
Decentralization	The distribution of responsibilities for decision making and operations to lower levels of government, community organizations, the private sector, and non-governmental organizations.
Demand management	The use of price, quantitative restrictions, and other devices to limit the demand for water.
Environmental health	Those aspects of human health and diseases that are determined by factors in the environment. It also refers to the theory and practices of assessing and controlling factors in the environment that can potentially affect health.
Financial autonomy	The ability of an entity to operate and sustain its activity for a long period based on the revenue it collects from the users of its services.
Fishing Fund	The whole fishing population and the other natural food resources, which represent the aquatic fauna of the fishing basins.
Flooded Areas	The surface of a piece of land in the major bed of a watercourse delineated by a water surface level corresponding to certain flows in high water circumstances.
National Navigable Waters	a) maritime waters considered pursuant to the law, as inner maritime waters; b) large rivers, rivers, channels and lakes inside the country, on their navigable sectors; c) frontier navigable waters from the Romanian bank to the border line.
Pollution	Any physical, chemical, biological or bacteriological water alteration of the water, above the established allowable limits, including the exceeding of the level of the natural radioactivity produced directly or indirectly by human activities, which make the water inadequate to the normal use, for the purposes in which such use was possible before the alteration occurred.
Protected Zone	The zone adjacent to the watercourses, water management works, associated structures and installations in which, from case to case, restrictions and interdictions are introduced, regarding the constructions regime or the land fund operation, in order to assure the stability of the banks and structures as well as the prevention of water resource pollution.

Recirculation	The reuse of water in a use process for the purpose of reducing the volume of the fresh water taken from the source.
Riparian state	A state through or along which a portion of a river flows or a lake lies.
River basin area	The whole area having a common outlet for its surface runoff; physical-geographic unit consisting of the river network up to the watershed.
Sea Shore	High and steep bank of a sea.
Sea Beach	The piece of land in the proximity of the sea comprised between the lowest water level and the limit of the land not affected by the dynamics of the aquatic environment.
Sanitation discharge	The minimum discharge required in a certain section on the watercourse, to provide the natural conditions for the existing aquatic ecosystems.
Servitude discharge	The minimum flow required to be permanently provided downstream of a dam, consisting of the sanitation discharge and the minimum water flow necessary for the downstream users.
Unaccounted-for measured	The difference between the volume of water delivered to a supply system and the volume of water accounted for by legitimate consumption, whether metered or not (or the volume of supplied water that is produced or treated, minus the water that is consumed legitimately.
Waste	Any substance, in solid or liquid state resulted from production processes or from household and social activities, which can no longer be used in accordance with its initial destination, and which would require special storing and maintenance measures, in order to be, eventually reused, for other purposes.
Water Register	The activity regarding the inventory, classification and synthesis of the data on the hydrological network, water resources, water management works, as well as the water intakes and effluents.
Wastewater	Water resulted from household, social or economic activities with pollutants or residue contents which alter its initial physical, chemical and the bacteriological characteristics, as well as pluvial water that run on polluted lands.
The water use right	The right acknowledged by law, granted to any person to use the water resources exerting the direct operative management right over the water resources and watercourse beds as a real right of use and disposition.
Water resources	All the surface waters consisting of river courses with their deltas, lakes, ponds, inner maritime waters and the territorial sea, as well as the ground waters throughout the country.

Water management	The integrated management of water based on the perception that water is an integral part of the ecosystem, natural resources and a social and economic benefit, whose quantity and quality determine the nature of its utilization. Water management represents the activities that, through a unified assemble of technical means and legislative, economic and administrative measures lead to the identification, use and rational valuation, maintenance or improvement of the water resources for the purpose of meeting the social and economic needs, to the protection of such resources against pollution and depletion, as well as to the prevention of and control of the destructive actions of waters.
Water management information	The quantitative and qualitative characteristics of the water resources, flooded areas, river banks and beds degradations, river basin hydraulic works and other water-related works, including the pollution sources and water quality protection works, and other natural or anthropomorphic characteristic elements, as well as the water use rights.
Water utility	The corporate management of the entity that is responsible for providing the services of drinking water supply and/or sanitation including technical, financial and human resources management.
Water arrangement and management frame-scheme	Water management documentation which presents the water management system model, containing the river network, the water management works, use-related intakes and effluents, analyzed in different scenarios and economical and social development stages, for the specific river basin, as well as the manner of protection, maintenance or improvement of the water quality.
Water quality treatment plants and installations	Plants and installations for obtaining drinking and industrial water, plants and installations for pretreatment/treatment of waste waters.
Water management unit	Any form of organization within the structure of Regia Autonoma "Apele Romane"
Water user	Any natural or legal person, which uses the water, the water surface or values the water fruit, during his activities.
Wetlands	A stretch of marshes, pulls, peat bogs, and other areas permanently or temporarily occupied by stagnant or running waters, sweet or salted waters.

1. Summary

The intention of this report is to summarize the social and economic impacts analysis of water pollution for the Romanian territory within the Danube River basin. Site-visits were made to the most affected locations, during which the social and economic aspects were discussed with different authorities and also with persons directly involved with water supply and sanitation, wastewater treatment, waste disposal, health units, etc. On the basis of the results of these discussions, and together with the information provided by the existing national or local reports and studies and with estimates and conclusions drawn by the national socio-economic expert, this report was developed, as required by the given TOR, one chapter of the environmental management story of Romania, within the Danube River basin.

The principal aims of this report were:

- To strengthen awareness of environmental health problems related to water pollution in Romania.
- To improve understanding on the importance of smooth management vertically and horizontally between the many actors on the environmental and health scene.
- To analyze the existing and future environmental health situation in the Danube River basin in Romania.
- To establish priorities for protection and improvement of water resources management strategy related environmental health issues.
- To provide knowledge of how health and socio-economic benefits can best be achieved from water, sanitation and hygiene education programmes, water pollution abatement actions and measures.
- To develop and endorse guidelines for a global strategy, which would focus on maximizing health and socio-economic impacts.

The methodology followed consisted of:

- Compilation of material already available on the subject.
- Development of partial reports.
- Visits to the affected location and updating the conclusion on the basis of information gathered.
- Elaboration of the report.

The major recommendations are:

- Water and environmental health problem programmes should be re-oriented to include goals and objectives, which focus on environmental health problems, behavior changes and health and socio-economic impacts. These objectives should be based on a thorough assessment of the household community situation and appropriate indicators established for monitoring and evaluation.
- Hygiene education must be an integral part of future water and sanitation programmes and action plans and the approach to water issues should be intra-sectoral and inter-disciplinary.
- Capacity building should be a major focus and an on-going activity of the water and environmental and health authorities.
- The cost effectiveness of water programmes must be improved if universal coverage is to be achieved. Strategies should include use of low cost and appropriate technologies and design, community management, community financing or cost sharing where this is appropriate, standardization of equipment, greater utilization of the private sector, and improved integrated monitoring.

A substantial share of environmental health hazards is due to water pollution.

In many localities, in the urban and especially in the rural area in Romania, contamination of surface and ground water used for abstraction was mainly produced by the lack of appropriate methods for the disposal of liquid and solid wastes from industrial and municipal activities.

The link between population and health hazards is related to inadequate water treatment and supply processes, including improper and ineffective operations and in many cases, total absence of treatment.

The measures taken by Romania for the sustainable improvements for human health protection include the treatment of the drinking water as an essential element of the integrated water resources and quality management as components of the wide environmental policy.

Policies on drinking water take into account of wider pollution control, water resources management and health and social planning. These elements are well integrated in the Romanian water resources management strategy.

Based on the background information collected in the present report and a result of their interpretation and some estimates, the conclusion is that the most important direct socio-economic environmental health related problem in Romania is related to drinking water quality. The shortage of water or lack of tap water in the houses, low coverage of public water supply in many rural areas impairs the well being and quality of life for many people in Romania.

The Romanian legislation framework reflects the need to manage all the natural resources as part of an integrated strategy, which involves cooperation of all the relevant governmental agencies.

Water resources in Romania are administered according to the principles of *integrated water management*, which links water quality and water quantity, ground water and surface water, together with the environmental and economic considerations.

The policy of self-sufficiency at any cost adopted by Romania from the early 1980s exacerbated inefficiencies throughout the economy.

The policies of growth with no regard to environmental costs are of the past. In view of the significant damage done to the natural environment, the Romanian government is committed to a development policy that integrates environmental considerations. Such a policy enables the conservation of natural resources, the avoidance of irreversible damage to the environment and the achievement of long term economic growth on a sustainable basis. Without such a development strategy, the cost of restoring the natural environment in the future will be prohibitively expensive. Moreover, in the long run, economic growth will decline with the continued use of the environment as a sink.

The introduction of policies that force producers to compete in open markets leads to restructuring away from heavy industries and towards less polluting lighter industries and services. Favorable impacts on the environment come from price liberalization and removal of subsidies, privatization, competitive markets, reform of taxation, interest and exchange rates. The impacts of these policy changes can be seen in the down-sizing of operations in a number of enterprises and outright closures for reasons of unacceptably high inefficiencies, low competitiveness and pollution impacts. It is therefore imperative that prices of energy, other industrial inputs, water, forestry and other natural resources be maintained at economic levels. Besides the removal of subsidies, the elimination of barriers to both domestic and foreign trade plays an important role in attaining and maintaining input prices to their economic levels.

Priority problems identified in the field of environmental protection are approached in a unified manner in the *Environmental Protection Strategy of Romania* developed by the Ministry of Water, Forests and Environmental Protection.

The following principles and general criteria have been adopted upon setting the objectives: preservation of human health conditions; sustainable development; avoiding pollution through preventive measures; conservation of biodiversity; preservation of cultural and historical heritage; "polluter pays" principle; protection against natural calamities and accidents; maximum cost/benefit ratio; adherence to International Environmental Protection Conventions and Programs provisions.

This new legal framework facilitated the use of several policy instruments, including environmental permits and licenses, user charges, pollution charges, subsidies, legal environmental liabilities and other appropriate economic instruments.

The Romanian government recognizes the challenges involved in implementing economic instruments aimed at addressing the environmental problems. The Ministry of Waters, Forests and the Environment approved the Environmental Action Programme in accordance with the LUCERNE model. The programme provides the guidelines for the targeted national strategies and the policy actions of greatest benefits in the short and the long run.

Having the framework *Environmental Law no. 137/1995, the Water Law 107/1996,* several *regulations* including a recent proposal on self-financing of EPA, Romania is at a crossroad in its efforts to create an **environmental sustainable development and market economy**.

By its contribution in preparing and disseminating this report, the author hopes to give a stimulus for further initiatives to be taken in Romania.

The author wishes to express sincere thanks to all who contributed to the development of this report.

2. State of the Danube Environment

Located in the southeastern part of Central Europe (latitudes: 43 degrees 20 minutes-S, and 48 degrees 20 minutes-N; longitudes: 20 degrees 20 minutes-W, and 29 degrees 50 minutes-W, and 29 degrees 50 minutes-E), Romania is a country with abundant natural and environmental resources. Water resources include the Danube River and twelve tributary basins, as well as part of the Black Sea. Forest resources include 6.3 billion hectares of forest, covering 26 per cent of the country' socio-economic surface. In addition to deposits of ferrous and non-ferrous metals, the country has reserves of oil, natural gas and coal.

Romania is also a home to the 650,000 hectare Danube Delta, which comprises the largest wetland in Europe.

The Danube River represents a boundary for Romania with three countries on the following lengths:

	Yugoslavia - 94 km; Bulgaria - 471 km; the former USSR (Ukraine) - 134 km;
	Total - 699 km

From the point where the Danube River enters Romania (the locality Bazias) up to the Black Sea, its water course length is 1,075 km, which represents 37.59% of the total length that is 2,860 km. 99% of the inland rivers belong to the tributaries areas of the Danube River Basin.

The quality of aquatic environment is determined by the state of representative elements presented in the Table 2.1.

a. concentration of dissolved oxygen, biochemical oxygen demand, total organic carbon;
b. concentration of hazardous substances in water, sediment and organisms;
c. functional variables, e.g. biomass;
d. communities, vegetation, fish, fauna;
e. deviation and disease in organisms;
f. physical factors (flow, construction and obstacles along the rivers, coastal zones, embankments, structure of sediments, regularization, channelization, embankments)

Table 2.1. Variables describing the state of environment

Effect	Indicative Variables
Pollution	Heavy metals, radioactivity, pesticides, floating oil
Sanitation	Dissolved oxygen, BOD, fecal, COD, TOC, salmonella
Eutrophication	Dissolved oxygen, nutrients, nitrates, ammonium
Salinization	Conductivity, chlorides
Acidification	Acidity, (pH), alkalinity

(Source: proposed by the expert)

The description of the state of the Danube environment on the Romanian territory is based on the identification of:

- all functions of the Danube River and its tributaries;
- the existing and future impacts of the Danube River on all the water uses;
- the relation between the water uses and the threats;
- measures and targets to be implemented within a specified time period.

The specification and assessment of all these issues include the full range of qualitative and quantitative aspects of the Danube River basin management on the Romanian area. (See Table 2.2.)

Table 2.2. The relation between the water uses and their impacts in the Danube River basin in Romania

	Floods	Pollution	Scarcity	Sedi-ments	Erosion	Eutrophi-cation	Saliniza-tion
Ecological	X	X	X	X	X	X	X
Water supply		X	X	X	X	X	X
Fishing		X	X			X	
Power gen-eration			X	X			
Mineral ab-straction		X					
Irrigation		X				X	X
Transport	X	X	X	X			
Navigation	X	X	X	X			
Recreation	X	X	X			X	
Tourism	X	X	X			X	

Source: as considered by the expert

The overall ambient state of national water resources in Romania is *fairly satisfactory*. This does not exclude the occurrence of serious local pollution problems.

However, even the appraisal of the state of environment in Romania might have some *pessimistic undertones*, we should accept the reality that through the rate of the pollution of surface waters has been lowered, the cleaning-up process proves to be slow and very costly.

The Danube River basin's environmental quality in Romania is considered as in other Danube countries being under great pressure from a diverse range of human activities.

In the urban areas the most significant adverse impacts on water quality are generated by the pollution from largely inadequate wastewater treatment plants and solid waste disposal facilities. In addition, the lack and inadequate capacity and technology and/or inappropriate operation of the wastewater treatment plants contribute to the increase of the water pollution. Moreover, the modernization and intensification of agricultural practices and livestock production are major sources of non-point pollution of surface and groundwater.

In the rural areas, the absence of the water decentralized supply systems and sewage networks and wastewater treatment plants have contributed to the worsening of the public health situation. Moreover, the *industry* has its large part of contribution to both the alteration of the water quality and water pollution process, mainly because of the existing old technologies and the absence of the wastewater pre-treatment plants.

The Danube River discharges substantial loads of nutrients and non-degradable contaminants into the Black Sea, which has reached a serious level of environmental deterioration as the result of these discharges.

The Danube water qualitative management has become a major concern for the Romanian experts as Romania is totally located within the Danube River basin and especially that the Danube River is the main collector and emissary of all the discharges from the riparian countries towards the Black Sea. The effects of these discharges on the water quality, especially in the Danube Delta and the Black Sea coast represent the topic of many studies that provide the following information:

- an increasing degradation tendency for the last 20 years in terms of water quality parameter values, proved by the laboratory analysis. Although in Romania, the global quality remains between the admissible limits, the increase of nutrient salts (Nitrogen and Phosphorus) and organic matters discharges had caused a significant phytoplanctonic growth, an algae masses and oxygen shortage development, both in the area of the reservoir "Portile de Fier" located on the Danube itself and in the Danube Delta;
- the existence of the herbicides and pesticides in the water resources (in particular in the ground water) is due, mainly, to the past use of these substances and their remanence in soil and water;
- unfavorable effects finally noted in the species evolution and in the ichthyofauna quality in the Danube Delta and in the Black Sea coast produced due to the increase of the navigation traffic and the harbor activities, as well as the use of pesticides on the agricultural lands;
- increased values of fluxes of certain pollutants, including some of heavy metals at Bazias locality, where the River Danube enters the Romanian territory. For instance, the fluxes for phosphates, silicates, TOC, detergents, organo-clorinates and certain heavy metals are higher at Bazias than the River Danube total inputs of these pollutants into the Black Sea;
- production of significant natural and anthropic inputs along the lower Danube courses. Certain industrial sites, as well as the Danube tributaries are important sources of different pollutants. The impact on the Danube water quality of the tributaries inputs is limited in space, in spite of their high contents in nutrients and other pollutants, because their water discharges are very limited compared with the Danube River discharge.

The self-regenerating capacity of the Danube River and the filtering role of both the wetlands and the Danube Delta are the main factors for improving the quality of the river and partially of its sedimentary load. On the last part of the Danube River, along the lower course and at the mouth zone, the water quality can be classified as to be in the first category or aerobic septic waters (Source: Study developed within a PHARE Programme, 1995).

The description of the state of the Danube environment should also include consideration on both Danube Delta and Black Sea. The existence of the Danube Delta within the Danube River basin and on the Romanian territory brings significant changes of the water quality of the whole country. Situated partly in Romania with the largest portion and partly in Ukraine where the Danube River enters the Black Sea, the delta area in Romania belongs to the 591,200 ha Danube Delta Biosphere Reserve. The core of the reserve (312,400 ha) has been established as a "**World Nature Heritage"** in 1991.

Danube Delta has a channels network of 3,463 km, with a density of 1.03 km/sq. km. The highest density of channels is between the arms Chilia and Sulina, 1.17 km/sq. km, while between Sulina and Sf. Gheorghe their density is only 0.71 km/sq.km. There are 668 natural lakes with area exceeding one hectare, which represent 9,28 % of the Danube Delta surface. The Delta has traditionally acted as environmental buffer between the Danube River and the Black Sea, filtering out pollutants and permitting both water quality conditions and natural habitats of fish in the Delta and environmentally vulnerable shallow waters of the northwestern Black Sea to be maintained at the appropriate admissible levels. Moreover, the Danube Delta is Europe's largest remaining natural wetland, with unique ecosystems, home to several rare bird species, being an important resting point for populations of migrating birds, rich in fish, with extensive reedbeds, forest, grassland and unusual flora and forest vegetation.

However, the Delta's values as a biological buffer and wetland ecosystem has declined over the last 40 years due to:

- increased pollution loading from the Danube, especially in phosphorus and nitrogen contents, producing negative effects including eutrophication on an area of 668 lakes, and accumulation of toxic and heavy metals in the soils and fauna;
- construction of several upstream dams and reservoirs with implications on the ecosystems components of the Danube's floodplains and wetlands;
- interference in the delta's natural hydrological cycle through the poorly planned and constructed channels, dikes and polders within the area of the Danube Delta;
- poor management and the existence of the competition and conflicts between the various economic activities in the delta;
- although some activities as tourism and hunting have been limited, but poorly controlled ecologically, construction of polders for agriculture has interfered with the water regime and destroyed wildlife habitats and breeding grounds for fish;
- the absence of proper sustainable management of reed harvesting and forestry activities contributed to the destruction of the wildlife habitats.

Having the purpose of achieving the protection, conservation and the recovery of the ecological balance of the Danube Delta, Romanian Government created in September 1990 the Danube Delta Biosphere Reserve. According to the provisions of the Government Decision, any human activity and intervention that could generate negative impacts on the ecological balance or to the existing natural background of the area, is forbidden.

In May 1991, the Danube Delta has been declared **"a Ramsar site"**. The whole protected area covers 679,000 ha including parts of the flood plain and marine area.

Within the protected area, there is possibly one of the largest expanses of reedbeds in the world, harboring at certain times of the year the majority of the world population of the red-breasted goose, *Branta ruficollis,* pygmy cormorant, *Phalacrocorax pygmeus*. Both species are threatened on a world scale. Five per cent of the population of the Dalmatian pelican, *Pelecanus crispus,* breeds in the Delta. (Source: World Bank Report, 1995).

The basic objectives for Danube delta management, within the Biosphere Reserve, include the proper balance between the goals of conservation, research and sustainable resource management for the purpose to meet economic needs (in particular for the local population).

The reports on the state of the quality of the environment in the Danube Delta indicate only moderate to small degradation of the ecosystems. (Source: PHARE Study on the water quality of Danube river basin, 1995). In the sediments there are As., Cr., Ni. and Mn, which show somehow increased concentrations in all studied areas, but only accidentally reaching an important pollution level above the permitted limit. The physical-chemical state of the Danube Delta water shows generally normal values concerning oxygen concentrations, conductivity, dissolved solid contents and pH. Some differences observed between Danube Delta lakes and channels with locally stagnant and/or confined water bodies are generally not directly connected to the recent anthropic activities.

2.1. Water Resources

2.1.1. Quantitative Aspects of the Water Resources

Romania's water resources are relatively poor and unequally distributed in time and space, being formed of surface waters - inland rivers, lakes and reservoirs, the Danube River and, of ground waters.

From the quantitative point of view, the water resources are indicated in both tables: Table 2.3. and 2.4.

Table 2.3. The Romanian water resources classification (billions m^3/average year)

Resource Category	Theoretical	Utilizable	
		Potential	Actual
Inland Rivers	40	14.5	13
Danube River	85[x]	20.0	10
Groundwater	9	5.8	3
TOTAL	134	40.3	26

[x] *Half of the stock at the country entrances*
Source: Romania, Water resources management strategy, 1996

The Black Sea water resources, although very important, can not be taken into account for the time being because of the technical and economical difficulties in seawater desalination.

Table 2.4. Utilizable resources on the river basins in 1996 (million m^3)

River basin	Total resources	of which		
		Surface water		Ground water
		Inland rivers	Danube	
Tisa	300	250		50
Somes	790	640		150
Crisuri	745	395		350
Mures	2,050	1,530		520
Bega-Timis-Caras Bir-zava	878	478		400
Nera	62	57		5
Cerna	78	73		5
Jiu	2,540	2,110		430
Olt	2,082	1,682		400
Arges	2,272	1,672		600
Vedea	191	41		150
Ialomita	847	430		417
Siret	3,126	2,294		832
Prut	894	854		40
other basins	2,352	1,830		522
Danube	20,946	-	20,000	946
Total	40,33	14,336	20,000	5,817

Source: Report MWFEP, 1997

The theoretical water resources of the *inland rivers and lakes* are estimated for about 40 billions m^3/year (with an average multiannual flow of 1,300 m^3/s), of which, in natural flow regime, only 5 billions m^3/year are utilizable, and, in actual river regime 13 billions m^3/year. Taking into account only the inland rivers, the specific resource is of about 1,700 m^3/inhabitant/year, a value relatively low if compared with other European countries resources.

Romania takes 85 billions m^3/year from the Danube theoretical resources, but the possibilities of their use in natural regime are also limited because of the river navigable character. Thus, only 30 billions m^3/year contribute to the water stock that can be technically used for consumption.

However, in Romania there are about 3,450 natural lakes with a water capacity of 2 billions m^3, they are of local importance in water resources management because only 400 millions^3 are fresh water.

Because only 12% of the potential resource can be used in natural flow regime, a lot of reservoirs had to be constructed for the timely redistribution of the water volumes. Interbasinal diversions for a territorial reallocation of the water resources according to the local demands had to be developed as well for many of the river basins of the Danube tributaries.

In 1996, the existing reservoirs were storing a total volume of 14.33 billions m^3 of which 5.5 billions represented the useful volume, generally with a multipurpose use: water supply for localities, industrial activities, irrigation, power generation or recreational uses.

Taking into account the existing and the future reservoirs, from the inland rivers we could have about 25 billions m^3 in a droughty year, which represents the maximum limit that could not be increased only by a successive reuse of the wastewater discharged through the sewage systems-treatment plants from localities and industrial units, as well as by both intensifying the industrial wastewater recycling and by improving the production technological processes.

The ground waters, generally with a better quality than that of the surface waters, are estimated at an available annual amount of 9 billion m^3, of which about 3 billion m^3 can be used under the existing technical and economical conditions.

The possibility of enriching the surface water resources through artificial rains and of the ground water resources through reservoirs has not been taken into consideration because the technical solution is not yet usual and economical.

However, there is a major economic and technical difficulty: the water resources called "technically utilizable" can not be used without the achievement of certain significant investments in complex and multipurpose water development works and schemes of the river basins and in the water treatment installations and plants because of the following constraints:

- the most important water resource, the Danube River, can not be used, but in a small extent, due to its eccentric position, at the Southern limit of the territory;
- the inland rivers are unequally distributed all over the territory, significant areas remaining with insufficient water resources, presenting at the same time important flow variations in time and space within the basin;
- the pollution of certain inland rivers exceeds the admissible limits, which makes difficult and sometimes even prohibitive their use.

2.1.2. Qualitative Aspects of the Water Resources

2.1.2.1. Water Resources Quality in Present

The discharge into the natural receivers, especially that of the large industrial platforms, of the non-treated or insufficiently treated wastewater, makes that the length of the degraded water courses, which can not be used for other purposes without being treated with high treatments, to be of more than 4,000 km, taking into account the provision of STAS 4706/1988, and of these in the II-nd and III-rd quality category, which can not be used as drinking water source, to be of more than 7,500 km.

With respect to the Danube River, the very high water flow ensures such a dilution of the received wastewater that the global quality of the water is included within the I-st and II-nd quality category limits. Even under these conditions the water supply for the riparian towns (Tr.Severin, Oltenita, Calarasi, Cernavoda, etc.) is affected, the treated water exceeding the admissible limits for human consumption in the case of certain parameters (ammonia, organic matters content, etc.)

The comparative analyses of the ground waters quality dynamics has pointed out an accentuated depreciation of this water resources quality, both from the point of view of the spatial extension of the affected areas and, of the pollution phenomena intensity in the main polluted areas. It may be mentioned that there are many interested areas with respect to the ground water reserves, which had been more or less affected by the increase of the pollutant concentrations. As a consequence, these water resources can not be directly used as drinking water; requiring necessary measures of adequate treatment selected case by case. The main causes of the water resources quality global deterioration may be synthesized as follows:

1. The development of certain gigantic industrial and livestock objectives;
2. The use and the promotion of certain high polluting production technologies, which in the developed countries had already been abandoned (i.e. pulp production through the sulfite process at the Dej and Zarnesti Pulp and Papers Works, soda production through the Solve process at Ocna Mures and Govora);
3. The rapid growth of the diffuse pollution share, especially caused by the irrational use of fertilizers and pesticides in agriculture;
4. The non-correlation between the production capacities growth and the urban development by the modernization of sewage works and, by the achievement of treatment plants;
5. The inadequate operation of the existing treatment plants (low friability constructions and installations, insufficient reagents, reduced energy shares, insufficient and non trained operational personnel);
6. The lack of an organized collecting, storage and management systems, especially for the mining, industrial and domestic wastes and for the sludge resulted from wastewater treatment plants, including the recovery of the useful substances.

To all these, there could be also added the fact that although in the past the former Water Law No. 8/1974 was very clear with respect to water pollution prohibition, the lack of certain efficient economic-financial measures, which should determine the increase of the concerns for rational management and water quality protection made it inoperative in certain cases. Thus, although in 1980, the Government had approved a programme concerning the development or the improvement of wastewater treatment plants and installations for the 1981-1990 period in order to increase the treatment capacity to the level of the discharged wastewater, water quality protection measures by developing treatment plants for all the water users and, installations for useful substances recovery from wastewater and sludge; promotion of less wastewater discharged from the municipal treatment plants and from livestock farms in the irrigation systems. Practically, its provisions had not been achieved but partially due to the lack of financial resources.

2.1.3. Romania Monitoring System for Fresh Water Resources Quality

The water quality monitoring in Romania has been initiated since 1954, but it started to be systematically performed beginning with the mid-70's when first methodological aspects, specific to this domain had been also elaborated.

These methodologies were defined by two fundamental elements:

- the spatial and temporal structure, which refers to the network of control sectors and stations where the water representative samples depending on time, are drawn in order to analyze the qualitative characteristics;
- the logistic means, consisting of method, methodologies, procedures, programs etc.

Within the national monitoring, the fresh water natural resources are grouped in three subsystems, differentiated by the nature of the component hydrological formations: surface flowing waters (rivers), lakes (natural and artificial) and aquifers ground waters.

"Regia Autonoma Apele Romane" has the responsibility to maintain in operation the water quality monitoring.

2.2. Biological Resources and Ecosystems

The biological assessment describing the evaluation of the biological status of the river (water body only) with respect to community structure and functioning represents a component of the *integrated ecological assessment of the aquatic eco-system*. To obtain the whole ecosystem impacts assessment it is necessary that *ecological and ecotoxicological assessment* should be carried out. Moreover, the water designated functions of the rivers, together with flora, fauna and the existing hydraulic structures should be also considered. With these theoretical ideas in mind, the assessment of the biological resources and ecosystem in Romania provided several conclusions.

An appropriate assessment of both issues related to the human uses and the ecological functions of the river basin, together with the cause-effect relation between them is based on the integrated approach. This analysis includes water quality and quantity for different human uses as well as flora and fauna. *Ecological quality assessment* represents a central element in the management of the water quality and water environment, providing the direct measure of the health of ecosystems.

The biological resources, all the ecoregions and ecotypes, and the functioning of the aquatic ecosystems are considered over the whole river basin, in an integrated concept.

In the ecosystem, the composition and the development of communities are determined by abiotic and biotic characteristics, including those resulting from the human activities.

Biological resources assessment has been done with respect to the intrinsec-actual or potential-ecological value, the designated uses of the rivers and its ecosystems, together with the physical characteristics of the rivers.

There are several potential adverse effects that might influence the aquatic ecosystem including discharging of toxic substances, organic pollution, leakage, and pollution loads from reservoirs and sea, human activities, disturbed habitats.

The assessment of the biological quality of the river basins was applied in an integrated manner, based on specific tools, such as information on the level of the benthic macroinvertebrate community, that includes both abiotic and biotic indexes:

- Biotic index, indicating basin differentiation.
- Saprobic index, especially for the polluted waters where the organic loads are extremely high.

Romania has some of the most important remaining natural *forest* in Europe with natural and semi-natural ecosystems covering 43 per cent of the country' socio-economic area. The Government recognizes this and has prioritized measures to protect and enhance the environment. The National Bio-diversity Strategy (1996) and National Environmental Action Plan (NEAP, 1996) have been prepared with assistance from development partners (UNDP, the World Bank and EU PHARE).

The *fauna* and *flora* on the Romanian territory are harmoniously disposed, being a highly valuable regenerative richness under the circumstances of reasonable exploitation.

Romania's *hunting fauna* decreased in number during the period 1989-1994. Significant reductions have been registered as regards the wild boar, the stag, the deer, the black chamois, the bear, etc.

The *fish* in the lakes and rivers also became seriously sensitive, mainly due to pollution, to the diminished interest for this activity and also to poaching.

Romania's *flora* includes more than 3,500 species of plants, 350 of which are growing on mountainous plains and more than 800 in oak and beech tree forests. The Danube Delta is a special ecological system, with its approximately 1,150 species of plants.

Of some 8,600 species of *birds* existing in the world, about 300 can be encountered in the Danube Delta; these represent approximately 78% of all such species in Romania and 3.4% of those existing in the world. About 300 species migrate from Asia, Africa and the polar zones.

Mammal species - almost 100 - are very much like the other mammals existing in Central Europe.

Forests are, mainly, an ecological asset, mainly due to their being this country's green lung on the one hand and also to their exploitable wood mass on another. Forests have first a determining and very important role in the maintaining and adjustment of the ecological balance on large areas. In 1994, the afforested area covered 6,368 thousand hectares, i.e. 27% of the total area of this country. The structure, according to species, of forest in Romania is:

- 1,930 thousand hectares resinous forest;
- 1,902 thousand hectares beech tree forests;
- 1,142 thousand hectares oak tree forests;
- 1,278 thousand hectares other deciduous species.

The weight of the deciduous species is 69.2%, while that of the resinous ones is 30.8%.

The forest distribution on the large vegetation zones is:

- mountainous (above 700 m altitude) 58.5%;
- hills (150 m-700 m) 32.7%;
- plain (below 150 m) 8.8%.

The relation between the rainfall quantity and the afforested area are clear on the Romanian territory. The district areas where there is a scarcity of forestry resources, with the afforested areas being somewhere between 4 and 10%, are also most of the time affected by droughts. The examples include large areas of the counties Calarasi, Braila, Constanta, Teleorman, Ialomita, Galati, Olt. Some other districts having only an area of 11-18% covered with forests are also highly affected by drought: these are the counties Botosani, Dolj, Giurgiu, Tulcea, Vaslui, Iasi.

There is an increase of 107,395 hectares, as against 1989 for the forest fund. The actual growth is however small due to the irrational cuttings practiced mainly during the period of 1991 and 1992.

The average production per hectare of wooden material is quite high, reaching values of: 280 m^3 - resinous, 250 m^3. - beech shrubs, 151 m^3 - quirkiness. The average growth index is about 5.4 m^3/ha/year, the yearly felling capacity being of 14.5 million m^3.

The considerable number of species of flora and fauna represents biodiversity in Romania.

With a view to preserving biodiversity and natural habitat and taking into account the necessity of integrating itself into the general policy of the international organizations, Romania has adhered to several international conventions, such as: "The Convention on the Conservation of Wild Life and of the Natural Habitats in Europe" Bern; "The Convention on International Trade with Species of Wild Flora and Fauna" CITES – Washington, 1994 and "The Convention on the Conservation of the Wild Animals Migratory Species" CMS – Bonn.

Among the *plants* protected by the Romanian law there are: Tisa (Taxus baccata), Edelweiss (Leontopodium alpinum), The Lady's Slipper (Cypripedium calceolus), Angelica (Angelica archangelica), the Spotted Tulip (Fritillaria meteagris), and the Romanian Peony (Paeonia peregrina).

The list of *birds* protected by law includes: the Bustard, the Birch Tree Cock, the Mountain Cock, the Mountain Aquila, the Black Vulture, the Small Egreta, the White Califar, the Red Califar.

There are numerous *animals* also protected by law, such as: the Chamois, the Lynx, the Marten, the Tortoise from Oltenia and Dobrudja, a.s.o. In Romania, the flora and fauna dissemination are conditioned by relief and pedo-climatic elements, being located in steps.

The plain

The plains, below 300 m altitude, occupy the west (West Plain), the south (Romanian Plain, Dobrogea Plateau) and the southeast (south of Moldavia) of the country.

The plain area includes the grazing lands in silvosteppe, the steppe, salted soils and sands. Crops occupy the most part of plain. The natural flora and fauna is reduced, most of the species being in danger.

The flora is represented by: poppy (Papaver dubium), field peony (Paeonia tenuifolia), mushroom (Agaricus arvensis), Salsola kali, carthusian pink (Dianthus carthusianorum), Euphorbia nicaeensis, Prunus spinosa, trefoil (Medicago lupulina), bromegrass (Bromus inermis), Hordeum murinum, Xanthium spinosum, Paliurus spina-christi, jasmine (Jasminum fruticans), Daucus carota, Salvia nemorosa, Acinus arvensis, chicory (Cichorium intybus), Agropyron pectiniforme, dandelion (Taraxacum officinale) etc.

Fauna is poor: Zebrina varnensis, locust (Calliptamus italicus), cricket (Gryllus campestris), beetle scarab (Scarabeus affinis), cockchafer (Anoxia villosa), large cabbage white (Pieris brassicae), gadfly (Tabanus autumnalis), turtle (Testudo hermanni), steppe lizard (Lacerta taurica), partridge (Perdix perdix), bustard (Otis tarda), sparrow (Passer montanus), ground squirrel (Citellus citellus), hamster (Cricetus cricetus), hare (Lepus sp.), Putorius putorius etc.

The forest

The forests have a large extent. There are willow forests in Danube Delta and poplar forests in floodplains. In silvosteppe area the wooden vegetation is dominated by different species of ***oak tree***: Quercus pedunculiflora, Quercus pubescens, Hungarian oak (Quercus frainetto), Turkey oak (Quercus cerris) and others trees associated.

In plain and hills areas the species of Quercus robur mixed with others species are prevailing. Higher, the evergreen oak (Quercus petraea) grows, in pure or combined forests. These types of forests include trees such as: hornbeam (Carpinus betulus), elm (Ulmus minor), common ash (Fraxinus excelsior), linden (Tilia cordata, Tilia tomentosa), sycamore maple (Acer platanoides); bushes like: hawthorn (Crataegus monogyna), Cornus sanguinea, cornel (Cornus mas), and different herbaceous plants: Melica uniflora, Brachypodium silvaticum, Festuca altissima, Genista tinctoria, Galium schultesii, Euphorbia amygdaloides, Amanita muscaria etc.

Animals, like oak glis (Eliomys quercinus), wolf, fox, hedgehog, pheasant (Phasianus colchicus), hoopoo (Upupa epops), nightingale (Luscinia), titmouse (Parus), woodpecker, Falco subbuteo, Carduellis carduellis, Lacerta viridis, Lucanus cervus, Lymatria dispar and many others, inhabit the oak forests. Beech forests cover the hills and the mountains between 500 - 1400 m altitude. The dominant species is the ***beech tree*** (Fagus sylvatica). In beech forest, linden (Tilia cordata), mountain sycamore (Acer pseudoplatanus), common ash (Fraxinus excelsior), rowan tree (Sorbus aucuparia) may also be found. The bushes are Spiraea ulmifolia, Lonicera xylosteum, filbert (Corylus avelana), blackberry bush (Rubus hirtus). The herbaceous vegetation is represented by Asperula odorata, wild strawberry (Fragaria vesca), Symphytum cordatum, Atropa belladonna, fern (Dryopteris filix-mas), Morchella esculenta, Lecanora subfusca etc.

Among oak and beech forests there are hay fields, glades, grasslands, orchards, vineyards etc.

The beech forest is the shelter of many animals: stag (Cervus elaphus carpathicus), bear (Ursus arctos), lynx (Lynx lynx), squirrel (Sciurus vulgaris), Martes martes, wild boar (Sus scrofa), Tetrastes bonasia, Turdus viscivorus, jay (Garrulus glandarius), Accipiter gentilis, Aquila pomarina, tree frog (Hyla arborea), salamander (Salamandra salamandra), Stauropus fagi, Melolontha sp., Daudebardia transsylvanica.

Spruce (Picea abies) is the dominant species in the resinous forests, which cover the mountains at more than 600 m, up to 1600 m. Beside spruces there are growing: Swiss pine (Pinus cembra), larch tree (Larix decidua), birch tree (Betula pendula), mountain sycamore (Acer pseudoplatanus), Populus tremula. Among trees there are Lonicera nigra, Sambucus racemosa, Rubur idaeus, bilberry (Vaccinium myrtillus), Monotropa hypopitys, Luzula albida, Campanula abietina. The mosses (Polytrichum commune, Dicranum scoparium, Hylocomium splendens) and the lichens (Usnea barbata) may also be found.

The resinous forests are populated with: bears, roebucks, foxes, Sicista betulina, capercaillie (Tetrao urogallus), Lyrurus tetrix, crossbill (Loxia curvirostra), blackbird (Turdus merula), other birds, reptiles, invertebrates like gasteropods (Vitrea diaphana, Retinella pura, Ena montana), butterflies (Lymantria monacha, Dendrolimus pini), coleopterans (Tetropium castaneum, Monochamus sartor), Crypphalus piceae, Anthaxia quadripunctata, Pineus pini etc.

Alpine area

On the mountains peaks the vegetation is represented by juniper tree (Pinus mugo), Juniper sibirica, Vaccinium myrtillus, Bruckenthalia spicufolia, Salix reticulata, dryas (Dryas octopetala), edelweiss (Leontopodium alpinum), bellflower (Campanula alpina), crosswort (Gentiana verna). The animals are less represented. Black goat (Rupicapra rupicapra), Microtus nivalis, some birds - hedge sparrow (Prunella collaris), mountain creeper (Tichodroma muraria), big predator birds included, like eagle (Aquila chrysaetos), lamb vulture (Gypaetus barbatus), Aegypius monachus, Gyps fulvus, viper (Vipera berus), water salamander (Triturus alpestris), gasteropods (Pupilla alpicola, Columella edentula), coleopterans (Carabus silvestris transsylvanicus, Nebrina gyllenhali) are some of these animals.

Water and wetlands areas

In the lakes, pools, swamps, springs, brooks, rivers and wetlands the flora may be represented by: algae, water lily (Nymphaea alba, Nuphar luteum), water spike (Potamogeton natans), water caltrop (Trapa natans), Salvinia natans, frog food (Lemna trisulca, Lemna minor), hornwort (Ceratophyllum demersum), Vallisneria spiralis, water plantain (Alima plantago-aquatica), Sparganium erectum, rush (Phragmites communis), bulrush (Typha latifolia), sedge (Carex riparia), Equisetum arvense, Dryopteris cristata, Sphagnum magellanicum, Mnium punctatum, alder tree (Alnus glutinosa), osier (Salix fragilis, Salix purpurea), white willow (Salix alba), Caltha laetha, Myosotis scorpioides, Veronica longifolia, Mentha aquatica etc.

Aquatic and wetlands fauna is represented by: sponges (Spongilla lacustris), worms (Polycelis felina, Tubifex tubifex, Hirudo medicinalis), lamellibranchiates (Anodonta cygnea, Unio pictorum, Dreissena polymorpha), gastropods (Theodoxus danubialis, Viviparus viviparus, Limnea stagnalis, Radix ovata), crustaceans (Daphnia galeata, Cyclops sp., Asellus aquaticus, Rivulogammarus balcanicus, Astacus astacus), insects (Perla sp., Libellula quadrimaculata, Nepa cinerea, Notonecta glauca, Dytiscus marginalis, Culex pipiens, Erystalis tenax). The waters are populated with: trout (Salmo trutta fario), huck (Hucho hucho), dace (Leuciscus cephalus), barbel (Barbus meridionalis), carp (Cyprinus carpio), perch (Perca fluviatilis), pike (Esox lucius), loach (Misgurnus fosilis), Gobio gobio, grayling (Thymallus thymallus), bream (Abramis brama), sturgeons etc. We also mention water salamander (Triturus cristatus), frog (Rana ridibunda), water turtle (Emys orbicularis), water snake (Natrix tesselata), diver (Podiceps cristatus), big cormorant (Phalacrocorax carbo), heron (Ardea cinerea), pelicans, swans, egrets, moor hen (Fulica atra), lapwing (Vanellus vanellus), ducks, gooses, blue gull (Alcedo athis ispida), tern (Chlidonias niger), wagtail (Motacilla flava), water rat (Arvicola terrestris), muskrat (Ondrata zibethica), otter (Lutra lutra).

Danube Delta

Danube River has built a land with a great variety of habitats at its mouth, flowing into the Black Sea. The Danube Delta, one of the most valuable places in Europe, was designated as a natural biosphere reserve in 1990. The scientists identified 20 different types of natural habitats.

Almost 400 freshwater lakes of varying size, broad reed beds, white willow forests, ash-oak forests and sand dunes are the main components of the Danube Delta landscape. This mosaic of biotopes shelters a diversity of wildlife.

After a preliminary investigation, the number of species living in the delta was estimated as being nearly 5000. The specialists identified 1514 species of plants, 3063 species of invertebrates and 325 species of vertebrates. Many of these species were found for the first time in the Delta (130 species of plants, 398 of invertebrates), some were new for Romania (10 species of plants, 97 of invertebrates and 2 of vertebrates) and 19 species have been described as being new for science.

Due to the diversity of ecological conditions, the Danube Delta vegetation has a very large spectrum of associations, from aquatic and marsh plants to extremely dry, steppe plants.

Together with other marsh plant, reeds form the dominant plant community of the area. With over 180,000 ha of almost compact reed beds, the delta holds the largest extent of this habitat in the world.

Increased levels of nutrients in the Danube have been, in every summer, the cause of extensive blooms in lakes and channels with still water. This phenomenon led to a dramatic reduction in the submerged vegetation of many lakes. Only those, like Erenciuc, Belciug and Rotundu, being slightly connected to the main stream, still show submerged vegetation, which once was typical for the whole area.

Four of the aquatic plants living here are protected: Angelica palustris, Aldrovanda vesiculosa, Trapa natans and Salvinia natans.

In the coastal area of the delta unique dune forests are draped with abundant creepers, including two of Mediterranean origin: Periploca graeca and Vitis sylvestris, giving the forest a tropical appearance.

The Danube Delta shelters 3400 species of invertebrates and vertebrates. The groups represented best are the insects, with over 2224 species. Among these, 237 have been described for the first time in this area, 45 are new for Romania and 13 species have never been seen before by a specialist.

The second largest group is the worms with 411 species. A quarter (101 species) has been described for the first time in the delta area, 37 species are new for Romania and four are new for science.

The third most numerous group of animals is birds, with over 300 species, 176 of them breeding here. But the real importance of the delta for birds consists in the presence of the greatest part of the world population of rare species like pygmy cormorant (Phalacrocorax pygmaeus) - nearly 60% - and red breasted goose (Branta ruficollis). The biggest delta bird is the common pelican (Pelecanus onocrotalus).

The Danube Delta provides vital habitats for 184 bird species, strictly protected.

Among the 64 fish species found here over the last years, two are new for Romania and one is new for science. The following species may be found here: sterlet (Acipenser ruthenus), stor sturgeon (Acipenser stellatus), Danube mackerel (Alosa pontica), sheat fish (Silurus glanis), common sturgeon (Acipenser guldenstaedti), marine sturgeon (Huso huso).

To ensure the diversity of wildlife in Danube Delta and its conservation for future generations, scientists introduced the principle of zonation of the area. Some of these core areas are: Sahalin-Zatoane (21410 ha), Rosca-Buhaiova (9625 ha), Letea (2825 ha), Periteasca-Bisericuta-Portita (4125 ha), Popina (98 ha) etc. Others areas like Babina islet, Pardina Island, Holbina etc were declared areas for ecological reconstruction.

The main Romanian reservations (protected areas) are presented in the Annex 2.1.

2.3. Human Impact

The evaluation of the physical, chemical and biological nature of water in relation to natural quality, human impact and designed water uses has been carried out in order to facilitate the understanding of the particularly water uses that affect or might adversely influence both the human and aquatic ecosystem health.

The Danube River basin's environmental quality in Romania is considered as in other Danube countries being under great pressure from a diverse range of human activities.

In the urban areas the most significant adverse impacts on water quality are generated by the pollution from largely inadequate wastewater treatment plants and solid waste disposal facilities. In addition, the lack and inadequate capacity and technology and/or inappropriate operation of the wastewater treatment plants contribute to the increase of the water pollution. Moreover, the modernization and intensification of agricultural practices and livestock production are major sources of non-point pollution of surface and groundwater.

In the rural areas, the absence of the water decentralized supply systems and sewage networks and wastewater treatment plants have contributed to the worsening of the public health situation. Moreover, the *industry* has its large part of contribution to both the alteration of the water quality and water pollution process, mainly because of the existing old technologies and the absence of the wastewater pre-treatment plants.

The Danube River discharges substantial loads of nutrients and non-degradable contaminants into the Black Sea, which has reached a serious level of environmental deterioration as the result of these discharges.

There is a great number of pollution sources that has been identified within the Danube River (including its tributaries).

First, in the Romanian Danube River Basin, 246 municipal wastewater treatment plants have been built and are in operation now. Their capacities range from few l/s to over 1,500 l/s. Municipal

wastes are collected and disposed by both private and municipal companies. In general each city or larger village has an active landfill in which wastes are disposed of. In addition one or more former landfills might be present. After industry the population represents the second target group in connection with the environment themes: 33% (BOD_5), 28% (N), 1% (P) from the total load emissions.

There are 616 localities provided with a centralized sewage system in Romania. out of this number 261 are cities and 355 villages. There are 9.1 million people connected to a sewage collection system out of which 8.7 million live in cities. The total amount of wastewater flowing directly, or through wastewater treatment plants is 80 m^3/s. Only 74% of this flow is treated. Out of 60 m^3/s that is treated, 11 m^3/s is treated only mechanically and 49 m^3/s flows through the biological steps. There are 204 municipal wastewater treatment plants in the country. There are 17 cities belonging to 11 counties placed along the left side of the Danube River, discharging directly about 537 thou.m^3 wastewater per day, that represent 39.5 percent of the total flow of wastewater discharged. About 470 thou.m^3 per day of municipal wastewater is discharged untreated into the river. Out of the 17 cities along the river, three cities are harbors suitable for sea ships. In these cities (Braila, Galati, Tulcea) live about 670 thou. inhabitants. No harbor along the river is provided with facilities to process the wastewater from the ships.

Table 2.5. presents the load contribution of the main Romanian inland rivers discharging into the Danube River, for the first 16 largest cities, having above 100,000 inhabitants, discharging wastewater into the inland rivers.

Table 2.5. The discharges of main localities

No.	Discharge Location	River/Catchment Area	Municipal Discharged (Population Equivalent)
1.	Bucharest	Arges	2,279,950
2.	Iasi	Prut	1,348,780
3.	Buzau	Siret	417,452
4.	Pitesti	Arges	307,973
5.	Bacau	Siret	199,849
6.	Ploiesti	Ialomita	197,050
7.	Timisoara	Bega	178,845
8.	Sibiu	Olt	164,000
9.	Braila	Danube	127,210
10.	Galati	Danube	105,096
11.	Brasov	Olt	102,169
12.	Cluj	Somes	101,096
13.	Botosani	Prut	73,301
14.	Suceava	Siret	65,744
15.	Ramnicu-Valcea	Olt	62,699
16.	Arad	Mures	48,900
17.	Craiova	Jiu	3,548
18.	Oradea	Cris	30,685
19.	Satu Mare	Somes	25,342
20.	Piatra Neamt	Siret	20,100
21.	Baia Mare	Somes	19,986
22.	Drobeta-Turnu Severin	Danube	19,680
23.	Targu Mures	Mures	16,986

Source: as estimated by the expert

According to the organic load (BOD_5) of wastewater discharged from these cities, in the second step we have selected only 12 cities, having thou. population equivalents (TEGW) above 100,000.

The main municipal wastewater source is the capital Bucharest (2,279,949.7 TEGW) whose mechanical-biological wastewater treatment plant was constructed, but it is not put into operation yet. Now it is working only partially with its mechanical step. The second wastewater municipal source is Iasi (1,348,780 TEGW). It has a mechanical-biological wastewater treatment plant smaller than their capacity (influent flow and load).

Along the Romanian sector of the Danube River and in the river basins of its main tributaries (Cerna, Jiu, Olt, Vedea, Arges, Ialomita, Siret, Prut), pollution is mainly due to *anthropic activities* and, partially to natural causes (certain source areas characterized by geological formations and/or soils, containing some chemical elements or compounds which could be considered pollutants).

The development of river hydraulic structures and water engineering works is connected with the population increase and economic development in the Romanian part of the Danube River Basin. The main objective of anthropic intervention on the river natural flow regime was to regulate and control the flow of the river stream, for the floods abatement, hydropower generation, irrigation, domestic and industrial water supply, navigation, etc.

The main hydrotechnical works carried out along the lower Danube course are:

- Iron Gates I dam (Km 942.95) and reservoir. The reservoir has an average surface area of about 172 Km^2 and a water storage volume of 1.7-2.37 millions m^3.
- Iron Gates II (Ostrovu Mare - Gruia) dam (Km 863) and reservoir, which is extended up to the Iron Gates I dam. The reservoir is serving as a compensation reservoir during hydropower peak operations.
- Flood control embankments for the protection of agricultural lands. On the Romanian side the protected area increased from about 50,000 ha in 1940 to about 100,000 ha in 1960 and to more than 430,000 ha in 1988, the total length of flood control embankments is over 1,000 km.
- The Sulina arm of the Danube Delta was straightened by 10 meander belts cut-offs from 85 to 62 km in the period 1902-1957.
- The Sf. Gheorghe arm was straightened by 6 meander belts cut-offs in the period 1986-1993, the stream being at present shortened by about 32 km.
- The permanent maintenance of the waterway for navigation of maritime ships up to Braila (about 170 Km upstream of the Danube mouth zone) through dredging different shoals and the mouth bar.
- The completion in 1984 of the Danube-Black Sea canal between Canada and Constanta (62 km long), which shortened the navigation route from Costanta to the Central Europe by 370 km. The canal is provided at the both ends with 310 m long and 25 m wide twin navigation locks, so the diversion of the Danube water discharge is very limited and permanently controlled in spite that the canal should supply water for the irrigation about 700,000 ha of agricultural land in Dobrogea area.

Second, chemical pollution coming from specific industries that still dump their wastes on land and water, and from farms using excessive amounts of fertilizers and pesticides represents a major concern for Romania. The presence of toxic wastes in rivers discharged by ships constitutes a threat, which cannot be neglected by the environmental and water authorities.

In the Romanian Danube River basin there is a great diversity of industries that were established in the last century. The more important types of industry are: ore mining activities; chemical and petrochemical industries; pulp and paper; metal works and machinery; food industry; textile industry; industrial farm units (pigs, cattle).

Some industries are already provided with facilities for pre- or total treatment of their wastewater. Generally speaking, the biodegradable pollution is not a problem for population, but so far for some specific types of wastewater no effective treatment technologies are available. In addition a problem with the so called "conventional clean" industrial discharges has been identified. A number of important industries are permitted to discharge processed water without polluting elements (conventional clean water) directly in the open water bodies. Recent monitoring activities indicate the most of these wastewater streams contain substantial pollution loads. Wastes generated by large-scale industrial activities are disposed of in specific deposits. In the river basins landfills are related to the following operations:

- mining deposits of sterile and sludge;
- inorganic chemical industry, deposits of lime sludge;
- organic chemical industry, deposits of organic solid residuals and sludge;
- paper production, deposits of pulp;
- metal works, deposits of sludge, casting sand;
- energy production, deposits of fly ash and shlag;
- farm breeding, deposits of manure.

Third important issue related to the human impact given by the pollution is caused by animal breeding farms, particularly pig farms. Nitrate, which is washed out of the soil and enters the water supply sources represents a major concern for the water authorities, as the amount of nitrate permissible in drinking water should be met. Nitrate is a problem for the risk to human health (Blue Baby Syndrome and stomach cancer) and the risk to the environment. Most of the leaching comes from the release of nitrogen from the soil organic matter due to the action of microbes. The nitrate is easily washed out of the soil over the winter, when the rainfall is high and there are very little crops water uptakes. The research carried out for the last years by the Romanian scientists identified ways for the efficient use of nitrogen.

Finally, the anthropogenic polluting activities developed in this huge river basin, the major regulation and hydrotechnical works achieved upstream, on the Danube River and its main tributaries, and the harmful human interference carried out inside of the Danube Delta area itself have disturbed the natural balance of the highly dynamic, but particularly sensitive, delta system. The overdevelopment of the navigation, fish farming and agriculture, the intensive reed exploitation, and badly planning construction of artificial channels and dykes for polder farming and water flood control carried out during the last fifty years, damaged the delta's natural resources. The decrease of the retention capacity, the alteration of the natural percolation of the water and the shift of the dispersal and distribution patterns of the sedimentary material inside the delta have increased the environmental degradation not only of the Danube Delta but even of the Black Sea.

Exploitation of the natural resources in the Danube Delta represents significant examples of human impact on environment, in Romania:

Fishing is one of the most important traditional land uses in the delta and many engineering works have been carried out in order to improve this activity. Fishing of the wild species is traditionally carried out in natural lakes and Channels of the delta, covering a total productive area of 170,000 ha. The drastic reduction of the fish-catch from peak 13,929 tones in 1967 to 3,864 tones in 1991 reflects the degradation of the wetland ecosystem. At the same time, a loss of the commercially valuable species has been registered. Beginning with 1950, fishing activities were undertaken in fish polders, as well, which now occupy about 40,600 ha. The production decreased in these areas, as occurred in natural regime zones, from 9,000 tones in 1988 to 3,710 tones in 1992. Some of the fishing farms have been abandoned (about 12,500 ha), so, at present they are to be subject to ecological restoration. It is the case of Holbina/Dunavat area, consisting of three fishing farm basins representing 5,630 ha.

Reed harvesting, as traditional activity of the delta inhabitants, was reduced in the past to household necessities (shelters, roof construction), gardening (fencing) or even feeding the animals during the winter. The heavy equipment used for harvesting (which destroyed the reed rhizomes), the high water levels artificially maintained for prolonged periods, the interdiction of reed burning (necessary for reedswamp regeneration), and loss of the ecological control led to the failure of reed yields from 226,000 tones in 1965 to 33,000 tones in 1990, and only 4,712 tones in 1994, obtained exclusively from natural sites, outside the polders. At present, about 3,306 Km^2 with natural flooding regime are used both for fishing and reed harvesting.

The anthropogenic polluting activities developed in this huge river basin, the major regulation and hydrotechnical works achieved upstream, on the Danube River and its main tributaries, and the harmful human interference carried out inside of the Danube Delta area itself have disturbed the natural balance of the highly dynamic, but particularly sensitive, delta system. The overdevelopment of the navigation, fish farming and agriculture, the intensive reed exploitation, and badly planning construction of artificial channels and dykes for polder farming and water flood control carried out during the last fifty years, damaged the delta's natural resources. The decrease of the retention capacity, the alteration of the natural percolation of the water and the shift of the dispersal and distribution patterns of the sedimentary material inside the delta have increased the environmental degradation not only of the Danube Delta but even of the Black Sea.

Navigation and fluvial transport represent one of the main sources of air and water pollution. The intense traffic of the boats on the main river arms including marine commercial shipping between Sulina and Galati, upstream the delta provides a great amount of toxic gases and contaminates the water with metals, phenols, oil, hydrocarbons etc. by waste discharge, accidental losses and fuel combustion. The docks supply similar discharges and the shipyards located in Tulcea. The same harmful impact is produced by the numerous boats, which navigate inside the delta area for economic (fishing, reed, food, freight, passenger transport etc.) or tourist reasons. The amount of polluting discharges resulted in 1993 from fluvial transport within the Danube Delta area have been estimated at 13,182 tones of burned fuel, 3,855 tones of waste discharges, 19,482 tones of sewage waters and 3,338 m^3 of various solid remains.

2.4. Key Issues of Environmental Degradation

The quality of aquatic environment in Romania was determined by the existence of several pollution sources and hydraulic structures.

- *Pollution* coming from the industrial activities, from the "hot spots" affecting environmental and human health
- *Heavy metals and highly degradable organic compounds* existing in sediments.
- Pollution coming from point emissions from the *wastewater treatment plants*.
- A diverse range of human activities has had serious influences on water quality and *agriculture* was not an exception. The modernization and intensification of agricultural practices and livestock production are major non-point pollution sources of surface and ground water. The Danube discharges substantial loads of nutrients and non-degradable contaminants into the Danube Delta region and Black Sea, which reached a serious level of contamination. For example, the Danube introduces high volumes of phosphorous and inorganic nitrogen. Additionally coastal settlements discharge their sewage and other effluent directly to the sea. Agricultural activities caused pollution due to the disposal in certain places of huge quantities of manure and animal waste from the large livestock industries. These farms were provided with purifying installations, but most of them were not put into operation or their operation activity was ineffective. The contradiction between the low quantities of fertilizers used and the pollution with nitrates could be justified by the relatively poor crops as com-

pared to the amount of fertilizers used, which is estimated to account for a 6% nitrogenous excess. As a result of fertilizer use, in some parts of the country, the surface water quality is being affected by the eutrophication with dramatic impacts on the aquatic ecosystem.

- In some areas of the country large quantities of fertile topsoil have been lost because of *erosion* due to specific land uses.
- Significant *deteriorated land surfaces* due to anthropic or natural causes.
- Increased *aggressiveness* of some biotic factors.
- *Extinction of threatened fauna and flora*.
- Drainage works being build all over the country are causing very often *depletion of wetlands*.
- *Excessive land use* has several negative consequences on the biodiversity and the natural habitats. Changes in agriculture practice produced unexpected effects elsewhere in the soil, plant, water, and atmosphere system.
- *Uncontrolled disposal* of the most part of domestic wastes, without required measures for the environmental protection
- Producing high quantities of *toxic and dangerous waste*.
- Water *eutrophication.*

The key issues of environmental degradation include not only the sources of pollution, but also the costs and benefits to restore the environment. Great attention has been placed over the years on the choice and design of economic instruments for a more efficient allocation of environmental goods and services and to stimulate environmental investment in such a way as to reduce the society-wide costs of attaining a desired level of environmental quality.

3. Analysis and Projection of Population and Water Sector Relevant Demographic Characteristics

3.1. Present Situation

3.1.1. Population

All the information given for the country of Romania represents the same information for the catchment area of the Danube River system, as Romania is considered as totally included in this basin.

The population of Romania, by area, along the years shows the following values:

Table 3.1. Population by area

	Inhabitants number			As percentage of total	
	Total	Urban	Rural	Urban	Rural
December 29, 1939	14,280,729	3,051,253	11,229,476	21.4	78.6
March, 15 1966	19,103,163	7,305,714	11,797,449	38.2	16.1
July, 1 1970	20,252,541	7,464,811	12,787,730	36.9	63.1
July, 1 1980	22,201,387	10,171,618	12,029,769	45.8	54.2
July, 1 1985	22,724,836	11,370,092	11,354,744	50.0	50.0
July, 1 1990	23,206,720	12,608,844	10,597,876	54.3	45.7
July, 1 1991	23,185,084	12,552,407	10,632,677	54.1	45.9
July, 1 1992	22,788,969	12,367,358	10,421,611	54.3	45.7
July, 1 1993	22,755,260	12,406,204	10,349,056	54.5	45.5
July, 1 1994	22,730,622	12,427,612	10,303,010	54.7	45.3
July, 1 1995	22,680,951	12,457,195	10,223,756	54.9	45.1
July, 1 1996	22,607,620	12,411,174	10,196,446	54.9	45.1

Source: Romanian Statistical Yearbook 1997, Bucharest

According to the population censures of the 7th of January **1992**, Romania had a population of 22.8 millions inhabitants, 56% were living in the urban area and 44% in the rural area. The average population density was 95.8 inhabitants/km^2, with the variation of 1291.7 inhabitants/km^2 in Bucharest, to 32.1 inhabitants/km^2 in the county Tulcea.

According to the Romanian Statistical Yearbook of **1997,** that is the most recent official statistics publication, Romania is a country of 22,607,620 million people.

Table 3.2. Population evolution of Romania between 1994-1996

Population of Romania						
	1991	1992	1993	1994	1995	1996
TOTAL	23,185,084	22,788,969	22,755,260	22,730,622	22,680,951	22,607,620
URBAN	12,552,407	12,367,358	12,406,204	12,427,612	12,457,195	12,411,174
RURAL	10,632,677	10,421,611	10,349,056	10,303,010	10,223,756	10,196,446

Source: Romanian Statistical Yearbook 1997, Bucharest

The classification of counties and localities by inhabitants number, July 1,**1996** is given in the Table 3.3.

Table 3.3. Population by counties and localities

Groups of counties, municipalities, towns and communes by number	Number of counties, municipalities, towns and communes		Inhabitants number	
	Absolute data	Percentage of total	Absolute data	Percentage of total
	Counties			
Total	42	100	22,607,620	100.0
Under 300,000	4	9.5	1,037,285	4.6
300,000-399,000	11	26.2	3,874,943	17.1
400,000-499,000	7	16.7	3,156,128	14.0
498,000- 599,999	6	14.3	3,247,477	14.4
600,000-699,999	6	14.3	3,881,679	17.1
700,000-799,000	5	11.9	3,682,158	16.3
800,000-over	3	7.1	3,727,950	16.5
	Municipalities and towns			
Total	262	100	12,411,174	100
Under 2,000	1	0.4	1,856	
2,000-4,999	10	3.8	38,159	0.3
5,000-9,999	56	21.4	427,069	3.4
10,000-19,999	85	32.4	1,160,046	9.4
20,000-49,999	63	24.0	1,986,254	16.0
50,000-99,999	22	8.4	1,677,705	13.5
100,000-199,999	13	5.0	1,844,958	14.9
200,000-999,999	11	4.2	3,237,849	26.1
1,000,000-over	1	0.4	2,037,278	16.4
	Communes			
Total	2,686	100	1,019,446	100

Source: As estimated by the expert

The evolution of the population on the river basin during 1994-1996 period is shown in the tables 3.4., 3.5., 3.6.

Table 3.4. Population by river basin in 1994

No.	River basin	Population				Main Localities		
		Total (Thou inhabit.)	% from the country's population	Out of which		Total	Out of which	
				Urban %	Rural %		Urban	Rural
1.	Somes-Tisa	2,085	9.16	53.0	47.0	231	22	209
2.	Crisuri	962	4.22	40.7	59.3	174	17	157
3.	Mures	2,137	9.39	53.4	46.6	326	36	290
4.	Bega-Timis-Caras-Birzava-Nera	1,121	4.93	60.8	39.2	176	11	165
5.	Jiu-Cerna	1,645	7.23	52.0	48.0	210	19	191
6.	Olt	2,628	11.55	52.2	47.8	420	37	383
7.	Arges-Vedea	3,940	17.31	76.0	24.0	200	17	183
8.	Ialomita-Buzau	1,957	8.6	36.4	63.6	230	31	199
9.	Siret	2,778	12.21	31.0	69.0	363	26	337
10.	Prut-Birlad	2,506	11.02	48.0	52.0	272	14	258
11.	Dunare-Litoral	996	4.38	57.2	42.8	124	30	94
12.	Total	22,730	100	54.5	45.5	2,726	260	2,466

Source: As estimated by the expert

Table 3.5. Population by river basin in 1995

No.	River basin	Population				Main Localities		
		Total (Thou. Inhabit.)	% from the country's population	Out of which		Total	Out of which	
				Urban %	Rural %		Urban	Rural
1.	SOMES-TISA	2,436	10.7	53.0	47.0	231	22	209
2.	CRISURI	940	4.1	40.7	59.3	174	17	157
3.	MURES	2,225	9.8	53.4	46.6	326	36	290
4.	BEGA-TIMIS-CARAS-BIRZAVA-NERA	1,100	4.8	60.8	39.2	176	11	165
5.	JIU-CERNA	1,650	7.2	52.0	48.0	210	19	191
6.	OLT	2,630	11.6	52.2	47.8	420	37	383
7.	ARGES-VEDEA	4,366	19.2	76.0	24.0	200	17	183
8.	IALOMITA-BUZAU	1,520	6.7	36.4	63.6	230	31	199
9.	SIRET	2,340	10.3	31.0	69.0	363	26	337
10.	PRUT-BIRLAD	2,500	11.0	48.0	52.0	272	14	258
11.	DUNARE-LITORAL	1,023	4.6	57.2	42.8	124	30	94
12.	TOTAL	22,680	100	54.5	45.5	2,726	260	2,466

Source: As estimated by the expert

Table 3.6. Population by river basin in 1996

No.	River basin	Population				Main localities		
		Total (Thou. Inhabitants)	% of country population	of which		Total	of which	
				urban %	rural %		urban	rural
1.	Somes-Tisa	2,436	10.7	53.0	47.0	231	22	209
2.	Crisuri	937	4.1	40.7	59.3	174	17	157
3.	Mures	2,222	9.8	53.4	46.6	326	36	290
4.	Bega-Timis-Caras-Birzava-Nera	1,100	4.8	60.8	39.2	176	11	165
5.	Jiu-Cerna	1,650	7.3	52.0	48.0	210	19	191
6.	Olt	2,613	11.5	52.2	47.8	420	37	383
7.	Arges-Vedea	4,239	18.7	76.0	24.0	200	17	183
8.	Ialomita-Buzau	1,520	6.7	36.4	63.6	230	31	199
9.	Siret	2,340	10.3	31.0	69.0	363	26	337
10.	Prut-Birlad	2,020	8.9	48.0	52.0	272	14	258
11.	Danube-Litoral	1,604	7.2	57.2	42.8	124	30	94
Total		22,607	100.0	54.5	45.5		260	

Source: As estimated by the expert

3.1.2. Area

From the administrative point of view, Romania is divided in 41 counties (judet), including the capital, Bucharest Municipality. The average area of a county is about 1,600 km^2, with an average population of 500,000 inhabitants. The counties' area (ranging from 8,678 km^2 - in Timis county to 3,705 km^2 Covasna County) is determined by the geographical conditions, traffic routes and by the traditional relation between the localities.

The figures used in the largest number of the studies are given on the county, town or municipality level. The expert has been forced for many situations to estimate to obtain the appropriate values to characterize the river basin.

Romania covers an area of **238,391 km^2**. Out of the total boundary length of 3,190.3 km, the river boundary represents 1,865.7 km, the territorial boundary 1,037,7 km and the sea boundary 287.9 km.

Administrative organization of Romanian territory (December 31,**1996)** given on the counties level is presented in Table 3.7.

Table 3.7. Administrative organization of Romanian territory

	Total area	Number of towns and municipalities of which		Number of communes
		municipalities	towns	
Romania	238,391	80262	182	2,686
County				
Alba	6,242	3	7	66
Arad	7,754	1	7	67
Arges	6,826	3	3	93
Bacau	6,621	2	6	79
Bihor	7,544	1	8	86
Bistrita Nasaud	5,355	1	3	53
Botosani	4,986	2	2	68
Brasov	5,363	2	7	43
Braila	4,766	1	3	39
Buzau	6,103	4	2	81
Caras Severin	8,520	2	6	69
Calarasi	5,088	1	4	48
Cluj	6,674	6	3	74
Constanta	7,071	3	8	52
Covasna	3,710	1	4	33
Dimbovita	4,054	1	5	76
Dolj	7,414	1	4	94
Galati	4,466	4	2	56
Giurgiu	3,526	1	2	46
Gorj	5,602	1	6	63
Harghita	6,639	2	7	49
Hunedoara	7,063	5	8	56
Ialomita	4,453	3	1	49
Iasi	5,476	4	2	85
Ilfov	1,593	1	0	38
Maramures	6,304	2	6	62
Mehedinti	4,933	1	5	59
Mures	6,714	3	4	90
Neamt	5,896	4	2	70
Olt	5,498	2	5	94
Prahova	4,716	2	12	86
Satu Mare	4,418	4	2	56
Salaj	3,864	1	3	55
Sibiu	5,432	2	7	53
Suceava	8,553	8	4	90
Teleorman	5,790	3	2	83
Timis	8,697	2	5	75
Tulcea	8,499	1	4	43
Vaslui	5,318	3	1	71
Valcea	5,765	2	6	77
Vrancea	4,857	1	4	59
Municipal Bucharest	228	1	1	

Source: Romanian Statistical Yearbook 1997, Bucharest

The catchment areas for each of the river basin are the figures given in the Table 3.8. and represent figures that are usually used for study purposes by the water authorities.

Table 3.8. Country area determined by river basin and type of land

River Basin	Total Area (Km^2)	% From The Country's Surface	Agricultural Land (%)	Degree Of Forestation (%)
SOMES-TISA	22,300	9.4	6.2	31.5
CRISURI	14,860	6.2	5.9	31.8
MURES	29,390	12.3	5.4	31.0
BEGA-TIMIS-CARAS-BARZAVA-NERA	14,440	5.6	8.5	30.3
JIU-CERNA	11,440	4.8	10.4	26.0
OLT	24,010	10.1	6.5	32.6
ARGES-VEDEA	17,980	7.5	6.7	27.7
IALOMITA-BUZAU	15,654	7.0	9.3	21.0
SIRET	30,406	12.6	4.4	44.6
PRUT-BIRLAD	18,210	7.8	8.6	13.0
DUNARE-LITORAL	38,730	16.3	3.0	11.0
TOTAL	237,500	100		

Source: as estimated by the expert

3.1.3. Per Capita Income

The data are provided both by expert estimates and according to the Household Integrated Survey (HIS) and the statistical yearly study on salary earnings and labor force cost, which was carried out in July 1, 1997 for the economic and social units from public, mixed, private, co-operative and community sectors.

A household of a certain socio-economic category was based on the main occupational status of the household head. The category "Peasants" includes households of self-employed in agriculture and members of agricultural associations. The households of "Retired people" also include agricultural pensioners.

In 1996, the composition of households by occupational status of households' members is presented in the Table 3.9.:

Table 3.9. Average number of person/households

occupational status of households members	Total Households	Households of				
		Employees	Employers	Peasants	Unemployed	Retired people
Total persons	2.888	3.441	3.535	3.280	3.556	2.263
Active persons	1.302	1.948	1.986	2.191	1.976	0.528
Employees	0.780	1.624	0.723	0.189	0.391	0.247
Self-employed in non-agricultural	0.048	0.016	1.079	0.021	0.030	0.013
activities	0.328	0.161	0.050	1.869	0.191	0.200
Peasants	0.131	0.125	0.119	0.092	1.343	0.060
Unemployed						
Others persons	0.015	0.022	0.015	0.020	0.021	0.008
Inactive persons	1.586	1.493	1.549	1.089	1.580	1.735
Retired people	0.677	0.092	0.079	0.122	0.085	1.373
Pupils and students	0.515	0.887	0.906	0.481	0.871	0.162
Housewives	0.145	0.175	0.193	0.110	0.199	0.102
Other persons	0.249	0.339	0.371	0.376	0.425	0.098

Source: Romanian Statistical Yearbook 1997, Bucharest

Total incomes include:

- Money incomes by origin sources (salaries, incomes from own-account activities, sales, unemployment benefits, pensions, children allowances, scholarships and other provisions of social protection, incomes from properties);
- Equivalent value of free provisions (goods and services);
- Equivalent value of consumption of food and non-food products from owns resources.

Table 3.10. Total incomes of households

	Total households		Households of									
			Employees		Employers		Peasants		Unemployed		Retired	
	'95	'96	'95	96	'95	'96	'95	'96	'95	'96	'95	'96
	USD, monthly by a household											
Total income	159	232	202	299	421	561	138	211	113	158	125	164
	Percentage											
59.8	72.1	69.0	81.0	79.5	90.3	89.4	47.6	42.8	62.4	60.8	63	60
GS^{x}	0.3	0.4	0.4	0.4	0.2	0.1	0.1	0.1	0.3	9.1	0.4	0.4
AP^{xx}	27.6	30.6	18.6	20.1	9.5	10.5	52.3	57.1	37.3	39.1	36.	40

Source: Romanian Statistical Yearbook 1997, Bucharest
Legend:
GS^{x} Equivalent value of goods and services
AP^{xx} Equivalent value of consumption of agricultural productions from own resources

Table 3.11. Exchange rate between the local currency and USD

	1990	1991	1992	1993	1994	1995	1996	1997
Exchange rate, Leu/USD End of year	35,0	186,0	433,0	1,14	1,77	2,55	3,75	7,20
Real wage index (1990=100)	100.0	78.0	72.0	56.0	69.0	77.0	72.0	68.0

Source: National Commission for Statistics
National Bank of Romania, Annual Report, 1996
IMF, Recent Economic Development, 1995, 1997.

Table 3.12. Proportion of poor people among the total population by areas, in 1995

	Percentage In Average Consumption Expenditure		
	40%	50%	60%
Total	6.9	14.0	23.3
Urban	4.3	9.3	17.0
Rural	9.5	18.4	29.4

Source: Integrated Household Survey, by National Commission for Statistics

From this table, it means that about 5,2 million people have a monthly consumption expenditure per person under 60% of the country's socio-economic average estimated consumption level. According to Integrated Household Survey, poverty is estimated using a relative method, considering that the person whose consumption expenditure are under a certain percentage (40%, 50% or 60%) of the country' socio-economic monthly average consumption expenditure.

The expert made some assessments to identify the minimum monthly wage.

The average income per person coming from the poorest household is considered to be more than three times lower compared with the richest one.

Table 3.13. The monthly average income per person in 1995

	average income - lei		Col1/Col2
	Poorest 20% Of Households	Richest 20% Of Households	
Total	86,869	308,275	3.6
Urban	87,176	302,625	3.6
Rural	86,682	371,230	3.7

Source: Integrated Household Survey, by National Commission for Statistics

3.1.4. Domestic Water Demand

Sustained water use of the river basins in Romania is based on a *multifunctional approach* in water resources management

Domestic demand is characterized by specific water-quality requirements, including criteria, objectives, targets. There is a close relationship between water quality and water quantity in river basins of Romania.

The water quantity variables influence the water quality and the interpretation of the water resources characteristics is depending on the combined data of both water quality and water quantity aspects. The changes in the water levels, flow characteristics, water-supply and all other water uses, the occurrences of sedimentation or erosion problems affect the water demand in Romania

At the end of 1996 about 2,740 localities had centralized drinking water systems (in comparison with previous year when there were only 2,653 localities) out of which 262 representing municipalities and towns. The total capacity of drinking water production was 10,234.8 thousands cubic meters per day and the total length of the supply network has exceeded 34.4 thousands Km.

The values indicated in the Table 3.14. represent the raw water demand, including all losses (up to 50%) and portions for public and economic uses.

Table 3.14. Total domestic demand on raw water (million m^3)

River Basin	1994	1995	1996
Tisa	4.633	4.661	6.360
Somes	132.264	142.123	139.760
Crisuri	55.895	57.592	57.718
Mures	143.201	151.315	159.113
Bega-Timis-Caras-Birzava	147.991	141.746	142.360
Cerna	3.813	3.463	3.772
Nera	0.660	1.128	0.544
Jiu	61.138	64.736	71.395
Olt	154.606	190.600	168.344
Arges	507.108	488.624	466.292
Vedea	10.344	11.782	12.897
Calmatui-Olt	0.245	0.295	0.213
Mostistea	0.213	0.231	0.235
Calmatui-Buzau	0.672	0.401	0.354
Siret	237.264	272.249	271.163
Ialomita	178.173	108.426	112.456
Prut	49.975	51.912	60.359
Littoral	89.947	89.779	90.278
Danube	272.220	278.418	298.729
Total Romania	2050.362	2059.481	2062.341

Source: As estimated by the expert

The following figures represent estimates of the expert from the values given in several studies on municipalities and rural levels.

The share of population connected to centralized water supply systems is about 13.8 millions inhabitants. About 10.5 millions of peoples from urban area and 3.3 million peoples from rural area are connected to the centralized drinking water supply systems.

For the rural areas:

A number of 2,391 villages and communes have water supply systems (representing 17,76% from their total number).

Only 346 rural localities are equipped with sewerage systems and generally the effluents are discharged into municipal wastewater treatment plants.

The total abstracted volume, for both urban and rural areas is 116.3 m^3/s, out of which 70.3 m^3/s are abstracted from surface waters and 46 m^3/s from ground waters.

The total amount of water delivered by the water supply system is about 2,588 millions m^3/year, out of which, 47.5% represent domestic use, 11.3% public use, 19.6% economic activities use and 21.6 represent the network distribution losses.

For given number of population and the total water consumption, the estimates show the following values:

The average per capita specific water consumption in the *urban area*, at the country level, is about 513 l/inhabitant and day out of which

Domestic use - 294 l/inhabitant and day;
Public use - 70 l/inhabitant and day;
Economic activities use - 122 l/inhabitant and day;
Network losses - 134 l/inhabitant and day;

In the *rural area* the specific consumption is 172 l/inhabitant and day.

Summarizing the evolution of the water demand for the last six years, the Table 3.15. shows the following values:

Table 3.15. Water demand evolution in Romania (Billions cubic meters)

	1970	1975	1980	1985	1990	1993	1994	1995	1996
Total	9.6	14.0	18.8	20.5	20.4	19.9	18.0	16.0	15.0
Industry	4.7	6.6	9.8	9.3	9.0	8.7	8.1	8.0	6.1
Agriculture	3.4	5.7	6.7	8.4	9.1	8.9	7.7	5.9	4.6
Domestic	1.4	2.0	2.2	2.6	2.2	2.2	2.0	2.0	2.0

Source: As estimated by the expert

The industrial water demand includes the water for industry supplied by their own facilities

The agriculture water demand includes water for irrigation and zootechnics.

The domestic water demand includes water for population, public utilities and local industry supplied through public network.

3.1.5. Domestic Wastewater Production

The evolution of the domestic water production is shown in the Table 3.16.

Table 3.16 Domestic wastewater production (Million m^3)

Basin	1994	1995	1996
Tisa	4.241	4.161	4.620
Somes	105.812	114.783	113.200
Crisuri	29.197	35.684	40.911
Mures	124.079	122.870	126.238
Bega-Timis-Caras-Birzava	141.130	133.769	143.396
Cerna(1	1.482	1.082	1.091
Nera	0.376	0.455	0.235
Jiu	47.758	52.107	57.517
Olt	115.350	137.883	132.660
Arges	247.762	391.479	335.786
Vedea	7.163	7.075	10.317
Calmatui-Olt	0.003	0.002	-
Mostistea	0.130	0.018	0.811*
Calmatui-Buzau	0.493	0.214	0.240
Siret(2	129.591	165.691	171.944
Ialomita(3	100.884	88.689	83.676
Prut(4	74.213	83.584	165.440
Littoral(5	67.762	54.299	72.200
Danube(6	121.839	133.276	141.017
Total Romania	1317.713	1527.121	1621.344

Source: As estimated by the expert
Notes:
1) The volumes discharged directly into Danube are not included;
2) The discharged volumes corresponding to the volumes abstracted directly from the Danube are included;
3) The discharged volumes corresponding to the volumes abstracted from the Arges River and Danube are also included;
4) The discharged volumes corresponding to the volumes abstracted from the Siret River are also included;
5) The volumes discharged into the Black Sea are included;
6) The discharged volumes corresponding to the volumes abstracted directly from the Cerna and Siret Rivers are also included.
** The discharged volumes corresponding to the volumes abstracted by the economic units are also included.*

Because there is not any accurate registration of the wastewater discharges in the existing papers, documents or synthesis reports of water authorities, it has been quite difficult to have a clear image over the all aspects regarding wastewater, and part of the figures was given as a result of computation made by the expert.

The activity of the domestic wastewater discharges has been achieved, in 1996, through public sewage, in 616 localities (261 towns and municipalities and 355 rural localities). The total sewage network length is 15,290 Km, which represent about 48,8% from the total length of the streets. It is estimated that about 41% from the total population is connected to the sewage systems but this does not always mean that all the wastewater collected will be discharge through a wastewater treatment plant. At the same time, in many situations, in the wastewater treatment plants, the wastewater coming from the industry are also processed, and thus it is very difficult to evaluate the specific wastewater discharge.

In the municipalities and towns provided with the sewage and water supply systems the percentage of the sewage network length is about 71.7% from the water supply network length. For the water and environmental authorities, the wastewater discharges assessment is used to provide information on:

1. Elaborating discharging permits and licenses;
2. Monitoring wastewater-discharging licenses;
3. Preparing compliance programmes;
4. Imposing measures and actions for eliminating, diminuating and remediations activities;
5. Elaborating forecasting to indicate accidental pollution;
6. Setting pollution charges;
7. Supporting inspection actions.

Environmental damages to many of the water bodies are produced by the high concentration of organic pollutants, including phosphorus and nitrogenous compounds, which stimulate eutrophication. The reduction of loads of pollutants in the existing wastewater treatment plants in Romania is quite slow. Untreated municipal sewage represents a pollution source of large importance for Romania.

3.2. Projection for Planning Horizons 2010 and 2020

3.2.1. Population

The estimates made by the expert have taken into account the rate of specific fertility for the last three years shown the following conclusions:

The natality was negatively influenced for the last years. The total population decreased for the years 1994-1996. Assuming that after 1998 we shall have the same rate of natality, a pessimistic prognosis of the population of Romania by the year 2010 shall be around 22 millions people. At the beginning of the third millenium the population shall reach the value of about 22,570 millions people and maybe in 2025 only 20,080 people will live in Romania. Another problem, very present in Romania, is the emigration. The peak of these phenomena has been reached between 1990 and 1992. After 1992 the illegal emigration has decreased, but should be considered for the future if the economic situation is not improved.

Taking into account these aspects the pessimistic prognosis is shown in the Table 3.17.

Table 3.17. The prognosis of the population

Year	Total population (thousands people)	Active population (thousands people)
1997	22,600	11,215
1998	22,635	11,230
1999	22,605	11,235
2000	22,570	11,240
2001	22,540	11,220
2002	22,500	11,200
2003	22,450	11,175
2004	22,400	11,145
2005	22,350	11,120
2010	21,970	10,915
2015	21,430	10,635
2020	20,785	10,300

Source: As estimated by the expert

If the rate of the natality improves after the year 1999, according to the prognosis given by National Commission for Statistics, then the figures shall be those presented in the Table 3.18. In this case an average increase rate of 0.04% has been taken into account.

Table 3.18. Population by 2020, by urban and rural area

Population of Romania			
	2000	2010	2020
TOTAL	22,643,793	22,734,368	22,825,305
URBAN	12,431,032	12,480,756	12,530,679
RURAL	10,212,761	10,253,612	10,294,626

The distribution of the population by river basin was also estimated by the expert by taking into consideration the rate of existing natality, the area of each river basin and the existing population of the river basins and considering that the increase will be the same for the each area. The values are given in the Table 3.19.

Table 3.19. Population, by river basin in the future

River basin	2000		2010		2020	
	Total	Urban	Total	Urban	Total	Urban
		Rural		Rural		Rural
SOMES -TISA	2,439,000	1,293,000	2,449,000	1,298,000	2,459,000	1,303,000
		1,146,000		1,151,000		1,156,000
CRISURI	938,000	381,000	942,000	383,000	946,000	385,000
		557,000		552,000		561,000
MURES	2,225,000	1,188,000	2,234,000	1,193,000	2,243,000	1,198,000
		1,037,000		1,041,000		1,045,000
BEGA-TIMIS	1,101,000	669,000	1,106,000	672,000	1,110,000	675,000
		432,000		434,000		435,000
JIU-CERNA	1,652,000	859,000	1,659,000	863,000	1,666,000	866,000
		793,000		796,000		799,000
OLT	2,617,000	1,366,000	2,627,000	1,371,000	2,638,000	1,377,000
		1,251,000		1,256,000		1,261,000
ARGES-VEDEA	4,245,000	3,226,000	4,262,000	3,239,000	4,279,000	3,252,000
		1,019,000		1,023,000		1,027,000
IALOMITA-BUZAU	1,522,000	554,000	1,528,000	556,000	1,534,000	558,000
		968,000		972,000		976,000
SIRET	2,343,000	726,000	2,353,000	730,000	2,362,000	732,000
		1,617,000		1,623,000		1,630,000
PRUT-BIRLAD	2,023,000	971,000	2,031,000	975,000	2,039,000	979,000
		1,052,000		1,056,000		1,060,000
DUNARE-LITORAL	1,606,000	919,000	1,613,000	922,000	1,619,000	926,000
		687,000		691,000		693,000

Source: As estimated by the expert

3.2.2. Domestic Water Demand

The evaluation of the domestic water demand has been made according to the Romanian standard 1343/1-91. Thus, the specific water consumption values being considered, by taking into account the losses and portions for both public and economic uses, were the following:

- for the urban area, between 335 l/inhabitant per day (level 2000) and
- 366 l/inhabitant per day (level 2020) and
- for the rural area, between 126 l/inhabitant per day (level 2000) and
- 259 l/inhabitant per day (level 2020), taken into account the degree of household provisioning with cold and boiled water facilities.

The estimated figures of water losses in considered area were:

- 36% in 2000, 29% in 2010, and 15% in 2020, in the urban area, and
- from 34% in present to 15% in 2020, in rural area.

For the technological consumption of the water purification plants the values taken into account ranging from:

- 9.2% in present to 7% in 2020, in the urban area, and
- from 3.2% in present to 4.5%, in the rural area.

The increase of the technological consumption in the rural area is due to the increase of water volumes abstracted from the surface resources.

The assumptions taken into consideration for the evaluation of the water demand for the planning horizons 2010 and 2020 include two scenarios:

1. considering that the losses remain at the same values;
2. considering a reduction of the losses during the period 1996-2020.

Table 3.20. The projection of the domestic water demand (million m^3)

River Basin	2000		2010		2020	
	With losses	With losses reduction	With losses	With losses reduction	With losses	With losses reduction
Tisa	6.678	6.544	7,679	7.141	10.750	9.030
Somes	146.748	143.813	168.760	156.946	236.264	198.461
Crisuri	60.603	59.39	69.693	64.814	97.570	81.958
Mures	167.068	163.726	192.128	178.679	268.980	225.943
Bega-Timis-Caras-Birzava	149.478	146.488	171.900	159.867	240.660	202.154
Cerna	3.960	3.880	4.564	4.244	6.390	5.367
Nera	0.571	0.559	0.656	0.610	0.918	0.771
Jiu	74.964	73.464	86.208	80.173	120.691	101.380
Olt	176.761	173.225	203.275	189.045	284.585	239.051
Arges	489.606	479.633	563.046	523.632	788.264	662.141
Vedea	13.540	13.269	15.571	14.481	21.800	18.312
Calmatui-Olt	0.223	0.218	0.256	0.238	0.358	0.300
Mostistea	0.246	0.241	0.282	0.262	0.394	0.330
Calmatui-Buzau	0.371	0.363	0.426	0.396	0.596	0.500
Siret	284.721	279.026	327.429	304.508	458.400	385.056
Ialomita	118.078	115.716	135.789	126.283	190.104	159.687
Prut	63.376	62.108	72.882	67.780	102.034	85.708
Litoral	94.791	92.895	109.010	101.379	152.614	128.195
Danube	313.665	307.391	360.714	335.464	505.000	424.200
Total Romania	2165.458	2122.148	2490.276	2315.956	3486.38	2928.564

Source: As estimated by the expert

3.2.3. Domestic Wastewater Production

In order to evaluate the domestic wastewater production for the planning horizons 2010 and 2020, a percentage of 80% of the water demand (with loss reduction) has been taken into account.

TABLE 3.21. The projection for planning horizon 2010 and 2020 of the domestic wastewater production (million m^3)

Basin	2000	2010	2020
Tisa	5.235	5.712	7.224
Somes	115.050	125.556	158.768
Crisuri	47.512	51.851	65.566
Mures	130.980	142.943	180.754
Bega-Timis-Caras-Birzava	117.190	127.893	161.723
Cerna	3.104	3.395	4.293
Nera	0.447	0.488	0.616
Jiu	58.771	64.138	81.104
Olt	138.580	151.236	191.240
Arges	383.706	418.905	529.712
Vedea	10.615	11.584	14.649
Calmatui-Olt	0.174	0.190	0.240
Mostistea	0.192	0.209	0.264
Calmatui-Buzau	0.290	0.316	0.400
Siret	223.220	243.606	308.044
Ialomita	92.578	101.026	127.749
Prut	49.686	54.224	68.566
Litoral	74.316	81.103	102.556
Danube	245.912	268.371	339.200
Total Romania	1697.718	1852.764	2342.851

Source: As estimated by the expert

4. Actual and Future Population Potentially Affected by Water Pollution

The assumptions, basic elements and conclusions used and presented in the present report refer to:

1. *Environmental health problems* include both the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often indirect) on health and well-being of the broad physical, psychological, social and aesthetic environment, which includes, inter ail, water supply, sanitation, recreation, as used by The WHO, Regional Office for Europe.
2. *Water and sanitation facilities* are necessary, but not sufficient factors, to bring about improvements in health as improving health can only be realized by achieving significant changes in behavior.
3. *Health benefits* will come from water and sanitation programmes but require multiple interventions and time to address also the water quality problems.
4. Health hazards are influenced by a number of *factors*, only one of which may be water pollution and lack of sanitation. These factors include previous exposure, immunity levels, susceptibility, number of organisms required to cause the disease and, of course the ecological settings. Unless these factors are known adequate objectives cannot be established.
5. Measuring the environmental health impacts of water pollution and sanitation is only useful if it is based on *appropriate objectives* and uses correct indicators for measurement. In the health sector in Romania is a general lack of knowledge of epidemiology, which results in inadequate goal setting, planning and measurement.
6. Moreover, the expert had to take into consideration how water, unsanitary conditions and lack of education were likely to impact on health in specific hot spots on the Romanian territory, as impact will vary depending on *literacy rate, existing morbidity and mortality, existing location quality and quantitative aspects of water resources* and current practice in the area.
7. The expert was looking to identify indicators that make sense. For programmes where the benefit is long-term, the indicators should include *process indicators* and *output indicators*.
8. Only when the information has been collected it is useful to look at *outcome indicators*. This might include incidence or severity of diarrhea; diarrhea-specific mortality rate; incidence of other water-borne, water-based and water-washed diseases.
9. The interpretation and the time needed to assess health impact is much more problematic as the *ecological and cultural setting* has a major impact in Romania as in any other country. For example where tube wells are the only source of drinking water, where ecological awareness and education levels are high and funds are available to provide well-designed in-house storage facilities, health impact may be seen in a relatively short period of time. However, if there are multiple sources of drinking water, where education levels are very low and poverty exists, it might take much longer to foresee a reduction in incidence or severity of a diarrhea.
10. There are considerable health and socio-economic impacts from water pollution, sanitation measures. Frequently, these impacts are *long-term* and many benefits are not recognized because the objectives and measurement are inappropriate.
11. The *benefits of health and socio-economic programmes are incremental*. Moreover, the greatest benefits are derived in the long term from a combination of water, sanitation and ecological education. The effects of *time* and the population *income* are very significant, too, especially in terms of improved nutrition of population.

12. The actual and future population potentially affected by water pollution should not be seen as associated with only one particular element, but with all components, which can influence the health. An integrated approach will include the aspects presented in the Chapters 4.1., 4.2. and 4.3.

4.1. Actual and Future Population Potentially Affected by Health Hazards through Raw Water Quality Exceeding Defined Quality Standards for Drinking Water

Assessing the exposure of population to hazards via drinking water is a difficult exercise as the all environmentally mediated exposure is difficult to determine. The number of factors influencing the exposure of population and the environmental health problems hazards are many and their interaction and ultimate effect of particular contaminants are hard to define, describe and evaluate for large groups of people with accuracy. The direct consumption of water for human needs impact on the population health represents the key issue of this part of the report. Several aspects and process indicators and output indicators were taking into consideration:

A. Diseases and deaths due to unsafe intake of drinking water;
B. The easiness of the access to the reliable water supply source;
C. The drinking water quality statistics.

Investigations carried out by the American Organization "Population Crisis Committee" since 1987 show that, when assessing life quality, drinking water is given top priority together with life expectancy, daily intakes of calories, vaccination of infants and the quality of education after grade seven. Management of drinking water supply, water treatment efficiency, distribution network development, monitoring and small-scale actions represent significant factors, which can be strengthened through specific management restructuring and financial resources at both levels: national and local.

There is a big need for trained staff and a huge request for adequate financial resources to maintain the distribution network. Practically, no surface water in Romania can be used for drinking purposes without being properly treated. The treatment methods include traditional ones: flocculation- coagulation, filtration, chlorinating.

The quality of the natural waters is mainly influenced by both pollution sources: point sources such as wastewater discharges, or by non-point sources of pollution, such as the use fertilizers and pesticides. It is important to note that the use of fertilizers and pesticides in Romania has decreased dramatically over the last 10 years. However, the discharge of untreated or insufficiently treated wastewater is the biggest problem not only for the use of surface water for drinking purposes, but also, especially in a longer perspective, for the use of ground water. In Romania the ground water resources are still of an acceptable standard, even limited areas have concentrations of nitrate exceeding the limits. The water quality in shallow wells and boreholes constitutes a special and serious health problem in rural areas. The results given by a study of MOH show that in Romania 92% of private wells have a nitrate concentration exceeding 50 mg per liter.

Discharge of sediments to the Black Sea has fallen by around 70% as a result of the extensive dam construction programme since 1945. In the Romanian Danube River basin a total of about 400 reservoirs have been built, mainly after the World War II. A qualitative monitoring system for sediments is not yet in place in Romania.

The Table 4.1. presents a comparison between the Romanian national standards and EU standards, for surface water quality.

Table 4.1. The quality of the surface water compared to EU Standards

No.	Romanian Legislation According the 4706 / 1988 standard				European Union Legislation Drinking Water					
	Parameters (mg/dm^3)	A_I	A_{II}	A_{III}	A_1		A_2		A_3	
					G	I	G	I	G	I
1.	Temperature (^OC)	30	30	30	22	25 (o)	22	25 (o)	22	25 (o)
2.	pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5	8.5	5.5	9	5.5	9
3.	Suspended matter (mg/L MES)	750	1,000	1,200	25	25	25	25	25	25
4.	Degree of saturation in O_2 (%)	min. 70	70	Max. 40	> 70	> 70	> 50	> 50	> 30	> 30
5.	Dissolved O_2	6	5	4	-	-	-	-	-	-
6.	Eh	-								
7.	Nitrates (NO_3)	10	30	-	25	50 (O)	50 (O)	50 (O)	50 (O)	50 (O)
8.	Nitrites (NO_2)	1	3	-	-	-	-	-	-	-
9.	Ammonia (NH_4^+)	1	3	10	0.05	0.05	1	1.5	2	4
10.	Ammoniac (NH_3^-)	0.1	0.3	0.5	-	-	-	-	-	-
11.	Nitrogen Kjddahl (NO_3^-) excepted	0.3	1	1.5	1	1	2	2	3	3
12.	Phosphates (P_2O_5)	0.03 P	0.1 P	0.15 P	0.4	0.4	0.7	0.7	0.8	0.8
13.	Sulphates (SO_4^2)	200	200	200	150	250	150	250 (O)	150	250 (O)
14.	Chlorates (CL)	250	300	300	200	200	200	200	200	200
15.	Phenols (C_6H_5OH)	0.001	0.02	0.05	0.001	0.001	0.001	0.005	0.01	0.1
16.	Hydrocarbons extracted with petroleum ether	-	-	-	-	0.05	0.05	0.2	0.5	1
17.	Polycyclic hydrocarbons	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.001
18.	Anionic active detergents	0.5	1	3	0.2	-	0.2	-	0.5	-
19.	Total pesticides (parathion, HCH, diedrin)	Organophosphoric nitrocompounds, triazine - 0.001			-	0.001	-	0.0025	-	0.005

Table 4.1. continued

20.	Sulfur (S^{2-})	-	-	0.1	-	-	-	-	-	-
21.	Cyanides (CN^{-})	0.01	0.01	0.01	-	0.05	-	0.05	-	0.05
22.	Selenium (Se)	0.01	0.01	0.01	-	-	-	-	-	-
23.	Arsenic (As)	0.01	0.01	0.01	0.01	0.05	-	0.05	0.05	0.1
24.	Cadmium (Cd^{2+})	-	0.003	-	0.001	0.005	0.001	0.005	0.001	0.005
25.	Mercury (Hg^{2+})	-	0.001	-	0.0005	0.001	0.0005	0.001	0.0005	0.001
26.	Lead (Pb^{2+})	-	0.05	-	-	0.05	-	0.005	-	0.005
27.	Total Chrome	-	Cr^{6+} 0.05; Cr^{3+} 0.5	-	-	0.05	-	0.05	-	0.05
28.	Copper (Cu^{2+})	-	0.05	-	0.02	0.05 (O)	0.05	-	1	-
29.	Zinc (Zn^{2+})	-	0.03	-	0.5	3	1	5	1	5
30.	Manganese (Mn^{2+})	0.1	0.3	0.8	0.05	-	0.1	-	1	-
31.	Iron (Fe^{2+}) total	0.3	1	1	0.1	0.3	1	2	1	-
32.	Nickel (Ni^{2+})	-	0.1	-	-	-	-	-	-	-
33.	Molybdenum (Mo)	-	0.05	-	-	-	-	-	-	-
34.	Vanadium (V)	-	-	-	-	-	-	-	-	-
35.	Cobalt (Co)	1	1	1						
36.	Calcium (Ca2+)	150	200	300	-		-	-	-	-
37.	Barium (Ba^{2+})	-	1	-	-	0.1	-	1	-	1
38.	Silver (Ag^{+})	-	0.01	-	-	-	-	-	-	-
39.	TOC - Total Organic Carbon				Mentioned but unrestricted					
40.	Total extractable organic chlorine				Mentioned but unrestricted					
41.	CBO_5	5	7	12	< 3		< 5	5	-	< 7
42.	CCOCr	10	15	25	-		-	-	-	30

Source: Prepared by the expert using Romanian standards and EU directives

- According to the provisions of the 4706 / 1988 Standard for water quality, we noted:
  $A_I = A_1$ Surface water good for drinking and for the food industry;
  $A_{II} = A_2$ Water for the development of the fish stock, for recreation and urban purposes;
  $A_{III} = A_3$ Water for irrigation system, washing stations and hydroelectric power plants.
- According to the European Union standards - Drinking Water Directive
  G - guide; I - Inoperative; O - exceptional climatic or geographic circumstances.

The source for comparison was given by the "Législation communautaire en matière d'environnement" Volume 7 Eau, Office des publications officielles des Communautés européennes, Luxembourg, 1993

The diseases and deaths due to unsafe intake of drinking water include:

- *Infant methemoglobinemia*, caused by intoxication from nitrate, is considered the second large environmental health problem associated with water in the Danube basin. Predisposition may be enhanced by diarrhea. Several thousand cases and numerous fatalities have been reported, usually from area, in which nitrate concentrations reach 100-200 mg/l, for 17% of the samples, from over 2,000 locations. These levels are found in shallow ground waters in Romania, too.

  This intoxication with metheloglobinemia is caused when elevated nitrate concentrations in drinking water (or even the breast milk) react with hemoglobin, which then can no longer transport oxygen. Especially infants are susceptible to methemoglobinemia, and the dose causing an effect is known quite accurately. It is reported that in some districts, up to 13% of newborn suffer from methemoglobinemia. Some cases have been observed even in rural areas where levels in drinking water above 45 mg/l were not registered; however, in 50% of the Romanian cases, microbial pollution was also present. The incidence of methemoglobinemia began to decline in 1994.

  However, by using alternative drinking water sources, the number of population being affected is lower as compared in 1996 and 1997 to previous years.
- *Contagious diseases* attributed to drinking water in the Danube Basin on the Romanian territory, together with the population being affected was also estimated by the expert:
  - Arges Basin - increase of infant mortality down stream of the Arges River from 23.8% at Arges to 38.3% at Calarasi (the effect is unclear, little gastro-intestinal disease, but high incidence of hepatitis, with effects of viral contamination of drinking water or wastewater contact);
  - Prut River - liver diseases are said to be highest among those drinking water from the shallow wells (intermittence in drinking water distribution, presence of fecal contamination in drinking water).
- Diseases due to *intoxication* from industrial and agrochemical in drinking water in the Danube Basin in Romania in '80ies:
  - observed effects: methemoglobinemia in 13% of the new-born; several deaths each year;
  - suspected causes: in 92% of the private wells nitrate concentration > 50 mg/l; elevated nitrate levels in 39 of 41 districts, maxim of 1,000 mg/l.
- The *microbial contamination* is not limited to the surface waters, but is also considered to be the most important health hazard in shallow aquifers and rural wells: dysentery, acute diarrhea, cholera and viral hepatitis were reported from shallow wells in Romania.
- High natural *arsenic* concentrations are also a problem in Romania, where concentrations may reach 100 µg/l or more. About 100,000 people are considered to be at risk and "high" (though unquantified) rates of skin cancer were reported.

- A great number of *bacteria* is reported from drinking water in rural area supplied by individual wells, and outbreaks of dysentery, acute diarrhea, cholera and viral hepatitis A are reported for 1991 in Romania, where half of the population depend upon shallow wells.

  Only 15% of the rural population are connected to water networks. For some areas not supplied with tap water, even the small amount of drinking water per person and day, i.e. the shortage of water as such, is regarded as one of the causes of acute diarrhea.
- Wasteful use in agriculture is a prominent cause of *water shortages*: in Romania, 2,5 million hectares of land (1/3 of all arable land) are irrigated.
- *Water shortage* will mean greater pressure to use poorer quality water, with a consequent risk of higher levels of pollution. Water shortage supports communicable diseases due to lack of personal and household hygiene. If water shortage interrupts central supplies, this degrades the quality of the treated water: loss of pressure in the mains due to shortage may enable ingression of untreated water. Together with stagnation in the mains, this encourages re-growth of microbes. In rivers, shortage due to abstraction rates higher than the rates of inflow leads to an increase in concentration of pollutants and oxygen consuming substances, and thus to poorer quality of the remaining water. In Romania, intermittence of the tap water supply is a serious problem for 30% of the population receiving tap water. This lack of supply together with the presence of fecal contaminants is a major *epidemiological* concern.
- The occurrence of *toxic cyanobacteria* is a natural phenomenon. The density of cyanobacteria in the surface waters depends directly upon the concentration of nutrients (phosphorus and nitrogen), up to a saturation limit, above which further increase of nutrient concentrations has no effect because other factors (usually lack of light due to high turbidity) limit growth. Along the Prut River, the average concentrations phosphate are 0.2 mg/l P and maxim reach 1 mg/l; nitrate concentrations average to 5 mg/l nitrate, reach maxim of 17 mg/l. These are several-fold too high to limit alga biomes. Further, the effect of nutrient loads carried by the Danube into the Danube Delta and Black Sea are causing heavy eutrophication of these ecosystems with disastrous consequences for fisheries and tourism.
- The causes of acute intoxication by industrial chemicals in water for human include *accidents and spillage*. Regular emissions of untreated industrial wastewater are a serious problem. Inadequate storage, handling, and especially transportation are the main causes of spillage and emergencies. For Romania, the WHO (1995) lists the chemical, petrochemical, dye, pulp and paper industries as well as coke burning plants as the worst polluters. Carcinogenic substances exceeding Romanian standards were found in water samples from 26 of 41 districts. In the Olt River, toxic pollution due to mining, chemical industry, pulp and paper, food, textile, pig and cattle farming is so heavy that it poisons alga proliferation and growth of benthic organisms, which would otherwise be consequence of the pollution with nutrients: although with high nutrient concentrations, the reservoirs situated downstream Ramnicu-Valcea are not eutrophicated, because of the toxic pollution. Contamination of the sediments of reservoirs is also reported.
- *Agrochemical* often present a health hazard through spillage, accidents, and acts of carelessness in handling and storage, but also through regular, continuos use, which leads to contamination of groundwater, surface runoff, and in some cases of crops. Nitrate is the chemical for which the heaviest impact on human health has been demonstrated in a number of areas of the Danube Basin, because it causes infant methemoglobinemia with a number of fatalities and thousands of cases of illness. Four million people alone in Romania are estimated to be at risk in consequence of elevated nitrate concentrations. Inadequate disposal of manure in small farms as well as septic tank effluents lead to local contamination of shallow aquifers and intakes of private wells.

Along the Danube, many laboratories suffer the lack of equipment for monitoring pesticides and other organic pollutants. In Romania, chlorinated pesticide levels above the ECU standard (0.1 μg/l) were measured in 73 percent of 100 tap water samples of 414 different towns, the highest levels being found along the Danube. Three towns along Prut River ranged from 12 to 480 percent of the standard, along the Bega River; in Timisoara they ranged from 0.312-1.031 μg/L with an average of 0.5 to 0.6 μg/L in tap water samples.

Some of the *conclusions* related to the actual and future population affected by water health hazards due to drinking water includes the following ideas:

Severe environmental health problems have been reported from Romania, especially with respect to air and water pollution. *Many observed effects cannot be related clearly to one single cause*. The following spectrum of environmental conditions posing health hazards has been reported:

- carcinogenic substances exceeding Romania standards were found in water samples from 26 of 41 districts;
- elevated nitrate concentrations were found in local water supplies in 39 of 41 districts of the country, and in 14 districts more than half of the supplies exceeded the national limit of 45 mg/L. In these districts up to 13% of the newborn suffer from methemoglobinemia, and there are several deaths each year from this condition. A high relevance of methemoglobinemia in areas with high nitrate concentrations in the water is reported especially for the region around Iasi. From 1988, the Hygiene and Public Health Institute reported nitrate concentrations above 50 mg/L from 92% of the Romanian private wells, some ranging up to 1000 mg/L; data presented at the Danube PCU Bratislava Workshop (1993) and supplemented by Iacob from the Environmental Research Engineering Institute in Romania show a recent decline of the number of reported cases of infants with methemoglobinemia. *Nitrates in drinking water* represent a major concern for the population. This situation is due of the fertilizers use, despite of the fact that quantities used in Romania were at the lowest level in Europe.

From the total number of analyzed samples, by the Romanian Institute for Hygiene and Public Health, in the interested area, in 1995, 6.3% were polluted only with nitrates (over 45 mg/l), and 66 % were polluted both with nitrates and microbiologically.

Depending on the well depth the situation is as follows:

- between 0-10 m: 7.6% are polluted only with nitrates and 36.9% are polluted microbiologically and with nitrates;
- between 10-20 m: 3.8% are polluted only with nitrates and 21.6% are polluted microbiologically and with nitrates;
- over 20 m: 2.6% is polluted only with nitrates and 9.3% are polluted microbiologically and with nitrates.

Annually, there are recorded 200-220 cases of acute intoxication for the new-borne babies (ages between 0-1 year) with a mortality rate of 6%. The evaluation of the methemoglobinemia cases has shown that there is a high risk for the population 0-1 year old which consume drinking water containing 100 -500 mg/l nitrates.

The study made for the children between 1 and 7 years has shown a high risk of methemoglobinemia (over 2% Hb) at the children, with ages between 1 and 3 years, which daily consume drinking water containing over 200 mg/l nitrates.

Regarding the mortality we have to emphasis the fact that the statistics are not very helpful because frequently methemoglobinemia is associated with other blood diseases.

The areas where methemoglobinemia has recorded high levels are Dolj, Iasi, Buzau, Giurgiu, Bacau, Mehedinti, Teleorman, Botosani and Olt counties.

Table 4.2. The number of cases of illness

Year	Cases reported	Fatalities reported
1985-1989	total of 1,418 = 283 per year	total of 53 = 10.5 per year
1992	124	3
1993	192	2
1994	105	5

Source: Reports of MoH

The recent decline may be due to a reduction in the amounts of fertilizer applied.

The situation in Romania requires fundamental improvements not only with respect to connecting the rural population (45.6% of Romania's population) to central water networks and upgrading existing facilities, but also especially with respect to resource protection.

The quality level of the drinking water resulted from the water quality measurements and analysis made, at the local level, by the specialized units of health authorities.

The localities and areas with inadequate drinking water represent those localities or areas in which the water delivered to the population has not met the permanent or temporary quality conditions according to the standard. In the Table 4.3., it is presented, in percentages, how much represents the number of unsuitable quality tests of the total number of analyzed samples.

Table 4.3. Drinking water quality in some localities in 1995

Locality	County	The frequency of the water samples exceeding defined quality standard (%)				
		1991	1992	1993	1994	1995
Bacau	Bacau	100.0	96.6	90.8	42.0	11.6
Oradea	Bihor	21.2	15.9	32.0	40.0	52.0
Marghita	Bihor	12.3	20.0	7.4	33.0	40.0
Bistrita	Bistrita Nasaud	8.4	4.1	3.1	3.4	2.0
Calarasi	Calarasi	38.2	89.6	61.8	10.7	10.6
Oltenita	Calarasi	12.4	40.9	25.5	42.5	-
Turda	Cluj	13.0	8.6	8.0	10.3	10.0
Campia Turzii	Cluj	20.0	13.5	11.0	29.4	23.0
Craiova	Dolj	1.4	2.4	1.6	3.2	3.2
Galati	Galati	20.7	11.2	26.8	14.6	20.8
Targu Jiu	Gorj	1.8	6.3	4.9	1.7	1.5
Iasi	Iasi	17.2	6.0	18.1	37.7	24.7
Harlau	Iasi	35.4	30.0	39.8	38.1	29.7
Pascani	Iasi	10.7	23.0	8.6	8.4	4.9
Targu Frumos	Iasi	47.2	16.0	32.0	28.0	24.6
Baia Mare	Maramures	66.0	56.0	58.0	51.0	29.7
Cavnic	Maramures	42.0	61.0	62.0	54.0	30.0
Targu Lapus	Maramures	3.6	5.0	16.0	53.0	50.0
Drobeta-Tr. Severin	Mehedinti	5.6	17.2	10.9	15.0	6.0
Slatina	Olt	28.8	56.0	84.4	73.0	70.9
Bals	Olt	56.6	45.0	39.0	95.0	91.8
Caracal	Olt	12.2	28.0	97.4	18.0	23.1
Suceava	Suceava	57.3	54.0	92.3	58.7	62.7
Turnu Magurele	Teleorman	30.8	41.3	43.6	25.8	9.8
Alexandria	Teleorman	52.1	60.3	96.7	83.6	95.7
Tulcea	Tulcea	63.2	19.0	4.0	6.0	7.0
Macin	Tulcea	88.2	29.0	50.0	7.0	7.0
Husi	Vaslui	7.0	33.0	50.0	32.5	16.6

Source: As estimated by the expert

Coverage and per capita consumption represent also a major concern for the drinking water quality. There is a considerable number of inhabitants, especially in rural area that do not have tap water in their houses.

It is expected that the total demand will increase moderately as an increasing share of the population gains access to tap water.

4.2. Actual and Future Population Potentially Affected by Health Hazards and Other Impacts on Welfare through Unsanitary Conditions in the Danube River System

The research from the International Research Center, The Hague, The Netherlands showed that the number of the actual and future population potentially affected by health hazards due to unsanitary conditions is very much influenced by the *hygiene behavior*.

Behavior change indicators must be developed in a participatory way and used with care. These indicators should be gender specific and include non-behavior indicators. Indicators must be related to the objectives. (Fig. 4.1.) (Source: Boot, 1993, UNICEF New York, 1993)

Figure 4.1. Examples of objectives indicators

Objectives: Use of safe drinking water

Indicators: Easy access
No unprotected drinking water supply source
No use of unprotected water

Objectives: All households use sanitary latrines

Indicators: Presence of latrines
Absence of soiling
Visits per day by age and gender.

The following data obtained by drinking water monitoring and surveillance have allowed identification of the water quality impact upon the consumer's health. For comparison purposes the information is given for both health hazards situations: unsafe drinking water and unsanitary conditions.

A. The situation concerning drinking water supply

1. Population supplied with drinking water 92%
   - From surface water sources 16.5%
   - From ground water sources 25.3%
2. Population supplied from potential polluted sources
   - From surface water sources 3%
   - From ground water sources 5%
3. Population supplied with water contained residual chlorine
   - MAC inefficient disinfected 38%
4. Population supplied with water unsuitable from the bacteriological point of view
   - total coliforms 48%
   - fecal coliforms 36%
5. Population supplied with water unsuitable from the chemical point of view
   - oxidable organic substances 52%
   - nitrates, ammonia 33%
6. Population supplied with water containing undesirable substances (iron, manganese, sulfides, etc.) 28%
7. Population supplied with water containing toxic substances (metals, pesticides, phenols, and oil products) 22%

B. The situation of the specific morbidity due to the transmissible diseases, possible influenced by the water quality (cases at the 100,000 inhabitants):

1. Total of supplied population 8,037,296
   - Typhoid fever 0.6
   - Acute diarrhea diseases 421
   - Viral hepatitis type A 254
   - Dysentery 111

C. The situation of the specific morbidity due to the transmissible diseases, possible connected with the water quality in relation with the residual free chlorine concentration existing in the delivering network (cases at the 100,000 inhabitants):

1. Total of supplied population for whom chlorine was under MAC 3,304,526
   - Typhoid fever 0
   - Acute diarrhea diseases 449
   - Viral hepatitis type A 313
   - Dysentery 108

D. The situation of the specific morbidity due to the transmissible diseases, possible connected with the water quality, in relation with the number of hours in which water supply is interrupted (cases at the 100,000 inhabitants):

1. Total of supplied population for whom water is delivered continuously 4,438,753
   - Typhoid fever 0.06
   - Acute diarrhea diseases 418
   - Viral hepatitis type A 183
   - Dysentery 133
2. Total of supplied population, for whom water is delivered, with interruptions, less then 8 hours 1,449,043
   - Typhoid fever 0.13
   - Acute diarrhea diseases 297
   - Viral hepatitis type A 333
   - Dysentery 58
3. Total of supplied population, for whom water is delivered, with interruptions, more then 8 hours 1,970,613
   - Typhoid fever 0
   - Acute diarrhea diseases 526
   - Viral hepatitis type A 311
   - Dysentery 106

The data resulted from the drinking water quality monitoring provide the arguments for further improved research concerning:

- The relation existing between the frequency of samples with fecal coliforms and transmissible diseases;
- The health parameters for the population, which is supplied with water containing undesirable substances.

The identified areas having the largest risk in terms of number of population affected by health hazards are Baia-Mare (heavy metals), Copsa Mica (heavy metals), cities from the plane area (pesticides), and city riverane to the Danube River (oil products).

One of the health problems generated by the unsanitary conditions is represented by *cholera*. The statistic for this disease between 1992-1995 has shown an increase of the phenomena as follows:

1992 - 3 cases
1993 -15 cases
1994 - 81 cases
1995 -118 cases

Usually, this disease occurs in the Danube Delta or in the counties neighboring Danube River. The most affected counties are Tulcea, Braila and Galati.

Between 1 October 1996 and 8 January 1997, in the Rovinari City, located in Gorj County, has occurred a severe acute *diarrhea disease epidemic*. A number of 285 peoples had health problems (especially children) and 6 of them died. The low level of sanitation, major deficiencies gave the causes of this epidemic in the water supply system and microbiological water pollution.

In case of diarrhea a number of studies indicate that quantitative aspects of water is more important that qualitative aspects in determining the incidence and severity. Studies also indicate a clear relationship between the incidence and severity of diarrhea among young children and dose level of enteric pathogens ingested. In some localities, the level of contamination was reduced so as to decrease the incidence of severe illness while the overall number of cases remains the same.

Table 4.4. Cases of potential water-borne diseases (Number of cases)

Year	1990	1991	1992	1993	1994	1995
Acute diarrhea diseases	96,006	95,908	97,314	95,624	113,986	88,093
Viral hepatitis	74,745	50,681	26,829	20,374	26,983	31,611
Dysentery	7,382	7,530	8,107	8,702	11,657	8,293

Source: As estimated by the expert and by using the Synthesis regarding the influence of the water quality upon the infectious and parasitic diseases Study elaborated by the Romanian Institute of Hygiene and Public Health, 1995

Table 4.5. Influence of the water quality upon the infectious and parasitic diseases (Cases per 100.000 inhabitants)

Year	1990	1991	1992	1993	1994	1995
Acute diarrhea diseases	413.6	413.7	427.8	420.2	501.5	388.4
Viral hepatitis	322.0	218.6	117.9	89.5	118.7	139.4
Dysentery	31.8	32.5	35.6	38.2	51.3	36.6

Source: Synthesis regarding the influence of the water quality upon the infectious and parasitic diseases Study elaborated by the Romanian Institute of Hygiene and Public Health, 1995

4.3. Description of Main Health Hazards through Water Pollution in the Danube River and Tributaries

Romania defines three classes of water quality in terms of chemical criteria and a fourth category is classified simply as degraded.

The water quality of the rivers is being observed in 276 supervision locations and 7 of them are located on the Danube. The length of the sectors subject to quality supervision is of about 20,500 Km and it represents the reference length. From the point of view of their quality, the watercourses fall into the following categories:

- Category I - includes the waters, which can be used for the drinking purposes, supply of the breeding farms and trout breeding units.
- Category II - includes the surface waters, which can be used for piscicultural purposes (species less sensitive than trout) for recreation and industry.
- Category III- includes the waters used for irrigation, hydropower and industrial cooling installations.
- Category D - includes degraded waters improper for the development of the piscicultural fauna.

Standards for discharges and for water quality are also being developed and the discharge standards are based on both water quality objectives and emissions limits.

The surface water quality has been improved in the period 1989-1996 mainly because of the decrease of the polluting units output and also as a result of the measures taking by the economic units to pre-treat the wastewater before their discharge into the natural receivers.

The river basins having the longest degraded watercourses (as related to the total length of the river) are Ialomita, Olt and Somes.

For most of the Romanian rivers the parameters have these values:

- pH= 6.5-9.0
- Dissolved oxygen= 4-9 mg/l
- Fixed residue=100-700 mg/l
- Sulphates < 100 mg/l
- Chlorides < 100 mg/l
- Total hardness < 20 German degrees, of which temporary hardness <10 German degrees

The limits for dissolved organic substances, the biochemical oxygen consumption, ammonia, phosphorus, nitrogen, oils and heavy metals exceed in certain sectors the permissible values.

In Romania there are not water treatment plants having a tertiary treatment step (for the nitrogen and phosphorus elimination) and for this reason the eutrophication is present in many lakes and reservoirs.

The diffuse pollution due to the fertilizer application as well as due pesticides and herbicides use on the agricultural lands is also important. At the river basin level, the average values of the concentrations of these substances, which entered the watercourses, were for the last years below the maximum admissible concentration. But the average values of the pollutant concentrations in the rivers are only a global indicator.

Reduction of the nutrient discharge is a national concern even if they cause no local problems.

Nitrogen can affect both yield and quality of a crop. A big charge of polluters, even on short duration, can result in catastrophic effects as far as life in that river sector is concerned. This is a case of the river sectors located near the serious polluting units (Bistrita, Bahlui, Trotus, Ialomita, Dambovita, Arges, Olt, Jiu, Bega, Bega Veche, Somes), in which the concentration of various polluting substances exceeds by 3-10 times the maximum permissible value.

Table 4.6. The rivers accumulated lengths on the quality classes in accordance with the estimated situation in 1996

No.	River basin	Cumulative length	Distribution of rivers Lengths on water quality classes							
			I		II		III		Degraded	
		km	km	%	km	%	km	%	km	%
1.	Tisa	467	414	88.7	5	1.1	-	-	48	10.2
2.	Somes	1,681	889	52.9	677	40.3	81	4.8	34	2.0
3.	Crisuri	1,093	402	36.8	681	62.3	-	-	10	0.9
4.	Mures	2,434	1,064	43.7	813	33.4	105	4.3	452	18.6
5.	Bega-Timis	1,119	1,005	89.8	53	4.8	34	3.0	27	2.4
6.	Nera-Cerna	258	258	100.0	-	-	-	-	-	-
7.	Jiu	944	568	60.2	178	18.8	136	14.4	62	6.6
8.	Olt	1,567	663	42.3	499	31.8	217	13.9	188	12.0
9.	Vedea	875	507	58.0	295	33.7	-	-	73	8.3
10	Arges	2,221	1,456	65.5	612	27.6	122	5.5	31	1.4
11.	Ialomita	1,175	357	30.4	287	24.4	12	1.0	519	44.2
12	Siret	4,000	2,402	60.0	1,063	26.6	152	3.8	383	9.6
13.	Prut	1,615	431	26.7	583	36.1	190	11.8	411	25.4
14.	Danube	1,287	746	58.0	413	32.1	128	9.9	-	-
	TOTAL	20,736	11,162	53.5	6,159	30.1	1,177	5.7	2,238	10.7

Table 4.7. The main rivers sectors with degraded quality water in 1996.

River basin	Watercourse	Sector	Length (Km)
Somes	Sasar	Baia Sprie-confluence Lapus River	19
Mures	Aries	Campeni-confluence Mures River	117
	Tarnava Mare	Copsa Mica-confluence Mures River	59
	Tarnava Mica	Tarnaveni-confluence Mures River	64
	Ampoi	Zlatna-confluence Mures River	39
	Geoagiu	Balsa-confluence Mures River	23
Bega-Timis	Bega-Veche	Beregsau-frontiera	27
Jiu	Amaradia	confluence Amarazuia River-confluece Jiu River	62
Olt	Barsa	Zarnesti-confluence Olt River	57
	Ghimbasel	Rasnov-confluence Barsa River	31
	Cibin	upstream Sibiu-confluence Hartibaciu River	18
Vedea	Cotmeana	Rachitele-confluence Vedea River	73
Arges	Dambovita	Glina-confluence Arges river	31
Ialomita	Ialomita	confluence Cricov River-confluence Danube River	257
	Prahova	downstream Brazi-confluence Ialomita River	94
	Teleajen	confluence Iazul Morilor River-Confluence Prahova River	30
Siret	Barlad	downstream Ghidiceni-confluence Siret River	46
Prut	Jijia	downstream Dorohoi-confluence Prut River	258
	Miletin	Flamanzi-confluence Jijia River	50
	Bahlui	Belcesti-confluence Jijia River	61

Source: As estimated by the expert

A large contribution to the water pollution is also given by airborne pollution, including acid precipitation containing sulphurous and nitrogenous compounds. It causes damages to water bodies that have limited buffering capacity, by destroying the basic conditions for any aquatic environment. One example may be given for the radioactive fall out.

5. Analysis of the Economic Significance of the Danube River System and Impacts of Economic Activities

5.1. Actual Situation

5.1.1. Abstraction of Raw Water from the Danube River System

5.1.1.1. Domestic Raw Water Demand

Table 5.1. Total domestic demand on raw water in 1996

River Basin	million m^3	% from total
Tisa	6.360	0.30
Somes	139.760	6.77
Crisuri	57.718	2.79
Mures	159.113	7.71
Bega-Timis-Caras-Birzava	142.360	6.90
Cerna	3.772	0.18
Nera	0.544	0.02
Jiu	71.395	3.46
Olt	168.344	8.16
Arges	466.292	22.61
Vedea	12.897	0.62
Calmatui-Olt	0.213	0.01
Mostistea	0.235	0.01
Calmatui-Buzau	0.354	0.01
Siret	271.163	13.14
Ialomita	112.456	5.45
Prut	60.359	2.92
Littoral	90.278	4.37
Danube	298.729	14.48
Total Romania	2062.341	100

In 1997 the domestic water demand will have a very slow increase mainly due to the increase of new connections of the rural localities to the centralized water supply systems.

5.1.1.2. Industrial/Mining Raw Water Demand

Table 5.2. Industrial raw water demand (million m^3)

River Basin	1994	1995	1996	
			Mil. m^3	%
Tisa	6.784	6.048	5.884	0.04
Somes	166.102	161.211	169.162	2.73
Crisuri	131.948	141.789	137.301	2.21
Mures	1137.396	1232.569	1091.301	17.61
Bega-Timis-Caras-Birzava	71.367	55.882	70.347	1.13
Cerna	0.349	0.386	0.284	0.004
Nera	0.663	10.686	11.257	0.18
Jiu	1600.012	1588.793	1624.380	26.21
Olt	324.073	344.307	336.786	5.43
Arges	481.961	448.553	408.027	6.58
Vedea	12.215	12.903	11.384	0.18
Calmatui-Olt	0.084	0.077	0.095	0.00
Mostistea	10.200	0.683	0.660	0.01
Calmatui-Buzau	-0.329	0.336	0.606	0.01
Siret	447.667	433.613	426.970	6.89
Ialomita	186.279	285.473	238.725	3.85
Prut	49.724	94.689	53.229	0.85
Littoral	1.490	2.115	2.150	0.03
Danube	710.019	1548.588	1607.193	25.94
Total Romania	5338.662	6368.701	6195.734	100.00

Source: As estimated by the expert

Assuming that the economic production continues to decrease in 1997, the industrial water demand will decrease (probably at the same rate as in 1994-1996 period).

Table 5.3. Data concerning the functioning regime of the main power plant in 1996

No	Power Plant	River basin	Q_{INST} (m^3/s)	Abstracted volume (thou. m^3)	Returned volume (thou. m^3)
1.	CET I Oradea	Crisuri	8.30	94628	56389
2.	CET II Oradea	Crisuri	0.39	6387	3073
3	CET Gura Barza	Crisuri	0.10	503	29.7
4.	CET Iernut	Mures	27.70	387.5	314.8
5.	CET Fintinele	Mures	8.05	1.4	1.0
6.	CET Deva	Mures	60.00	429.3	343.4
7.	CET Vest Militari	Arges	0.60	7570	270
8.	CET Timisoara Sud	Bega	1.00	2950	-
9.	CET Progresul	Arges	8.50	6740	5200
10.	CET Sud	Arges	15.40	9620	4600
11.	CET Anina	Bega-Timis-Cerna	0.90	*	*
12.	CET Govora	Olt	1.10	16880	2190
13.	CET Brazi	Ialomita	1.82	21760	8655
14.	CET Grozavesti	Arges	10.60	12470	9900
15.	CET Comanesti	Siret	1.67	7735	23
16.	CET Borzesti	Siret	27.00	80983	78682
17.	CET I Iasi	Prut	0.36	4791	1790
18.	CET II Holboca	Prut	0.54	4431	1454
19.	CET Ovidiu	Litoral	0.15	36	36
20.	CET Palas	Litoral	0.47	13786	2415
21.	CNE Cernavoda	Dunare	54.0	741587	741587

Source: RENEL reports
**Activity stopped at 1.01.1990*

5.1.1.3. Agricultural Raw Water Demand for Irrigation

Prior to the transition, rural areas were mostly dependent on regional up and down integrated monopolies that provided most of the activities in the rural sector. Since the beginning of the transition period, the situation in the agriculture is not promising. In the agricultural sector the number of the specific rural policies and strategies promoting sustainable development of the rural and agricultural sector is very limited. More appropriate policies and stronger incentives to encourage both long-term development of rural areas and increase of the efficiency in economic activity are needed.

Table 5.4. Agricultural raw water demand for irrigation (million m^3)

River Basin	1994	1995	1996	
			Mil. m^3	% from total
Tisa	0.012	0.012	0.022	0.001
Somes	1.518	1.654	2.063	0.13
Crisuri	2.593	1.600	1.490	0.10
Mures	49.023	27.658	11.477	0.76
Bega-Timis-Caras-Birzava	6.726	6.137	5.975	0.39
Cerna	-	-	-	-
Nera	-	-	-	-
Jiu	6.180	2.347	2.730	0.18
Olt	69.998	32.102	49.923	3.31
Arges	13.130	5.411	6.993	0.46
Vedea	0.716	1.343	0.970	0.06
Calmatui-Olt	-	0.270	0.250	0.015
Mostistea	16.374	19.623	9.990	0.66
Calmatui-Buzau	1.065	0.811	0.243	0.016
Siret	22.633	99.590	79.760	5.30
Ialomita	19.028	13.565	10.182	0.67
Prut	37.068	30.369	32.073	2.13
Littoral	4.979	4.000	21.910	1.45
Danube	1428.095	967.389	1267.786	84.30
Total Romania	1740.138	1213.881	1503.837	100

Source: MAFF reports

Table 5.5. The situation of irrigation in 1996

River Basin	Surfaces arranged for irrigation (Thou. Ha)	Number of irrigation systems	Surface irrigated in 1996 (Thou. Ha)	Irrigation Percentage
Tisa	0.230	1	0.110	47.82
Somes	1.418	10	0.278	19.60
Crisuri	11.276	75	0.340	3.01
Mures	29.508	83	15.902	53.89
Bega-Timis-Caras-Birzava	11.578	16	0.894	7.72
Cerna	-	-	-	-
Nera	-	-	-	-
Jiu	6.954	24	2.070	29.76
Olt	189.298	22	24.656	13.02
Arges	120.602	34	6.629	5.49
Vedea	0.690	10	0.344	49.85
Calmatui-Olt	3.220	3	0.080	2.48
Mostistea	193.848	8	4.983	2.57
Calmatui-Buzau	0.888	3	0.681	7.69
Siret	182.433	208	40.271	22.07
Ialomita	43.377	28	8.455	19.49
Prut	104.247	49	12.756	12.23
Litoral	5.692	10	4.728	83.06
Danube	2073.467	100	501.173	24.17
Total Romania	2978.726	684	624.350	20.96

In 1997 the water demand for irrigation will decrease because of the following reasons:

- The year 1997 has been a rainy year;
- The breaking up of the land property made more difficult the efficient use of irrigation;
- The prices for the irrigation water are relatively high.

5.1.2. Wastewater Discharge to the Danube River System

5.1.2.1. Municipal Discharge

Table 5.6. Domestic wastewater production in 1996 (million m^3)

Basin	1996
Tisa	4.620
Somes	113.200
Crisuri	40.911
Mures	126.238
Bega-Timis-Caras-Birzava	143.396
Cerna(1	1.091
Nera	0.235
Jiu	57.517
Olt	132.660
Arges	335.786
Vedea	10.317
Calmatui-Olt	-
Mostistea	0.811*
Calmatui-Buzau	0.240
Siret(2	171.944
Ialomita(3	83.676
Prut(4	165.440
Litoral(5	72.200
Danube(6	141.017
Total Romania	1621.344

1) The volumes discharged directly into Danube are not included;
2) The discharged volumes corresponding to the volumes abstracted directly from the Danube are also included;
3) The discharged volumes corresponding to the volumes abstracted y from the Arges River and Danube is also included;
4) The discharged volumes corresponding to the volumes abstracted from the Siret River are also included;
5) The volumes discharged into the Black Sea are included;
6) The discharged volumes corresponding to the volumes abstracted directly from the Cerna and Siret Rivers are also included.
** The discharged volumes corresponding to the volumes abstracted by the economic units are also included;*

Table 5.7. Discharged wastewater volumes, by year

Year	Discharged Wastewater Volumes (millions cubic meters)*					
	Wastewater Treatment Unnecessary	Wastewater treatment necessary				TOTAL DISCHARGED
		Without treatment	With treatment		Total	
			Insufficient	Sufficient		
1994	-	746.753	656.953	202.621	1606.327	1606.327
1995	-	797.702	893.822	204.042	1895.566	1895.566
1996	-	791.516	804.048	275.583	1870.147	1870.147

** including the industrial wastewater discharged through the public sewage systems*

In 1997 the volumes of wastewater discharged will increase, but there will be a very slow improvement of the effluent quality. This is due of a new policy implemented by the MWFEP, which requires an improvement of the treatment facilities in 5 years period in order to reach the new provisions from the Water Law (1996).

5.1.2.2. Industrial Discharge in 1996

Table 5.8. Industrial and mining discharge in 1996 (million m^3)

River Basin	Total discharged	Out of which mining waters
Tisa	10.777	6.660
Somes	136.143	12.244
Crisuri	85.533	3.723
Mures	877.309	-
Bega-Timis-Caras-Birzava	44.861	3.236
Cerna	0.369	0.064
Nera	0.836	0.314
Jiu	1519.267	1.869
Olt	244.793	0.600
Arges	321.167	-
Vedea	8.705	-
Calmatui-Olt	0.068	-
Mostistea	-	-
Calmatui-Buzau	0.093	-
Siret	313.821	0.264
Ialomita	122.751	0,120
Prut	4.190	-
Litoral	1.610	-
Danube	1313.669	0.674
Total Romania	5005.962	29.768

Table 5.9. Wastewater volumes discharged by year for the industries

Year	Discharged Wastewater Volumes (millions cubic meters) *					
	Wastewater treatment unnecessary	Wastewater treatment necessary				TOTAL DISCHARGED
		Without treatment	With treatment		Total	
			Insufficient	Sufficient		
1994	1991.923	225.715	951.110	250.468	1427.293	3419.216
1995	2189.261	228.673	637.535	223.531	1089.739	3278.970
1996	2664.121	197.333	868.179	263.850	1330.362	3994.483

** include just a part from the total industrial wastewater volumes (a part is included in the municipal waste water discharged and another was not covered by the official analysis)*

For the 1997 the industrial wastewater volumes will decrease but the percentage of treatment will increase slowly.

5.1.2.3. Agricultural Discharge

Table 5.10. Wastewater volumes discharged by year for agriculture

Year	Discharged Wastewater Volumes (millions cubic meters)					
	Wastewater treatment unnecessary	Wastewater treatment necessary				TOTAL DISCHARGED
		Without treatment	With treatment		Total	
			Insufficient	Sufficient		
1994	168.06	7.275	30.108	2.812	40.195	208.255
1995	66.800	4.268	18.753	3.319	26.34	93.14
1996	171.819	2.932	20.683	2.64	26.2555	198.074

In 1997 the volumes of the wastewater coming from agriculture will decrease dramatically because of huge reduction (over 60%) of the breeding farms. The quality of the effluent will be slowly improved.

As a comparison we present the situation of the wastewater treatment in previous two years:

Table 5.11. The situation of wastewater volumes discharged in 1995

River Basin	Discharged Wastewater Volumes (millions cubic meters/year)					
	Wastewater treatment unnecessary	Wastewater treatment necessary				Total Discharged
		Without treatment	With treatment		Total	
			Insufficient	Sufficient		
TISA	7.800	4.272	4.011	7.375	15.658	23.458
SOMES	59.142	52.275	125.423	70.576	248.274	307.416
CRISURI	-	2.156	57.014	2.929	62.099	62.099
MURES	793.724	54.718	226.847	91.216	372.781	1166.505
BEGA-TIMIS	-	76.225	86.629	19.030	181.884	181.884
NERA-CERNA	-	0.694	0.527	1.179	2.400	2.400
JIU	1324.100	86.500	60.040	8.660	155.200	1479.300
OLT	1.465	66.161	239.254	66.897	372.312	373.777
VEDEA	-	0.130	14.329	0.158	14.617	14.617
ARGES	0.091	569.352	125.786	0.360	695.498	695.589
IALOMITA	9.540	-	162.256	5.681	167.937	177.477
SIRET	55.630	12.596	314.517	41.893	369.006	424.636
PRUT	0.009	1.703	3.119	0.044	4.866	4.875
DANUBE	9.060	103.861	71.480	37.764	213.105	222.165
LITTORAL	-	-	54.348	77.130	131.478	131.478
TOTAL	**2260.561**	**1030.643**	**1545.580**	**430.892**	**3007.115**	**5267.676**

5.1.3. Pollution of Aquatic Systems through Potential Soil and Ground Water Contamination

5.1.3.1. Municipal Solid Waste Disposal

During 1996, in Romania there have been produced 53.7 millions of tons industrial waste, 6.696 millions of tons urban wastes, 3.8 millions of tones agricultural wastes and 0.2 millions of tons other wastes. At the same time, 49.5 millions of tons of sterile have been produced by mining industry. The total quantity of 6.696 millions of tons domestic wastes collected by the sanitation services has been composed by:

- 4.28 mil. tons from population;
- 0.5 mil. tons from public services;
- 1.5 mil. tons sludge from wastewater treatment plants;
- 0.28 mil. tons from local industry;
- 0.12 mil. tons other (coming from building sector, demolishing activities).

In fact, each locality either urban or rural has own waste disposal site. From the total number of the urban waste disposal sites, 85 % are located outside the localities but 23 of them are located on the riverbanks having an important adverse impact on the environment and humans. Only 11% from the urban waste disposal sites have environmental license.

5.1.3.2. Industrial/Mining/Hazardous Solid Waste Disposal

Comparing with 1995 there is an increase of the industrial wastes (about 0.06 millions of tons) and a decrease of the urban wastes (about 0.144 millions of tons). Significantly, the amount of sterile coming from mining industry decreased from 288.4 millions of tons in 1995 to 49.5 millions of tons in 1996, mainly because of the diminishing of mining activities. The important amounts of wastes have been generated by the energy production sector (19 mil. tons), mining sector (9.5 mil. tons - excluding sterile), food industry (9.3 mil. tons), metallurgical industry (7.2 mil. tons) chemical industry (5.2 mil. tons).

Recycling and re-use of wastes

From about 114 mil. tons of wastes, including and sterile coming from mining, only 21,17 mil. tons have been recycled and reused, meaning 19% from total quantity.

Excluding the mining sterile, and taking into account so-called wastes, which represent 64.396 mil. tons the recycling and reuse percentage is about 32.87 %. Comparing with 1995 there is an increase in reuse of wastes with 1.47 mil. tons mean about 2.67%.

This process was recorded only concerning industrial wastes; municipalities had not concerns for waste re-use and recycling, their activities being oriented only for waste collection and definitive disposal.

Waste disposal

The first option for the waste removal was definitive disposal. There is 893 disposal sites for the industrial wastes, which are:

- 206 tailing ponds
- 197 mining sterile dump heap;
- 110 ash and slag dump heap;
- 363 industrial waste disposal sites;
- 17 underground disposal sites;

At the same time, there are 233 municipal waste disposal sites, in which industrial wastes have been dumped. (0.84 mil. tons in 1996).

Comparing with the EU countries the quantity of waste definitive disposed is very high.

A major problem is represented by the environmental pollution generated by the waste disposal sites. From the total number of the industrial waste disposal sites 30% are located inside the urban localities, having and an important landscape adverse impact. At the same time, there are 56 disposal sites, without any specific facilities, located on the riverbanks. Only 23% from the industrial disposal sites have environmental license.

Around industrial complexes some indication of soil pollution has been identified (Copsa Mica, Baia Mare, Zlatna).

Industrial discharges, leachate from abandoned waste dumps and soils contamination with pesticides, all contribute to the load of toxic micropollutants reaching the Black Sea from the Danube and its tributaries.

Some of the micropollutants are absorbed by sediments and accumulate in dams. Those that pass the dams are deposited near the mouth of the Danube and spread out from here to the downstream location. (Source: Review of river basin management practices in the Danube river basin. 1996, HR Wallingford Report). Reducing these discharges and eliminating the diffuse sources of pollution is a daunting task for all the water users. An important concern is given to the fact that, by many presently used waste-removal and disposal methods large toxic substances simply return to the environment.

5.1.4. Hydro Power

Table 5.12. The main hydropower plants in 1996

Hydropower Plant	River	River Basin	Electric Capacity (Mw)	Annual Production (Gwh/year)	Locks And Fish Pass
Mariselu	Somes Cald	Somes	220.5	390	Y
Tarnita	Somes Cald	Somes	45	80	Y
Somes Cald	Somes Cald	Somes	12	19.4	Y
Gilau I	Somes Mic	Somes	6.9	11.6	Y
Gilau II	Somes Mic	Somes	6.9	12.2	Y
Floresti I	Somes Mic	Somes	6.9	12.2	-
Colibita	Bistrita	Somes	17	47.5	Y
Strimtori	Firiza	Somes	4.2	15	
Astileu I	Crisul Repede	Crisuri	2.8	14.0	-
Astileu II	Crisul Repede	Crisuri	1.0	7.6	-
Lesu	Valea Iadului		3.4	6.7	-
Dragan-Remeti	Valea Draganului	Crisuri	100	200	-
Munteni	Valea Iadului	Crisuri	58	113.4	Y
Lungasu	Crisul Repede	Crisuri	18	35	Y
Tileagd	Crisul Repede	Crisuri	18	35.2	-
Oasa	Sebes	Mures	150	260	Y
Tau	Sebes	Mures	150	260	Y

Table 5.12. continued

Hydropower Plant	River	River Basin	Electric Capacity (Mw)	Annual Production (Gwh/year)	Locks And Fish Pass
Gura Apelor	Riul Mare	Mures	335	605	Y
Ostrovul Mic	Riul Mare	Mures	15.9	24.6	Y
Paclisa	Riul Mare	Mures	15.9	25.1	-
Hateg	Riul Mare	Mures	15.9	23.1	-
Crainicel	Birzava	Banat	8.27	31.7	-
Breazova	Birzava	Banat	0.34	2	-
Grebla	Birzava	Banat	10	35	-
CHE Cerna-Motru - Tismana	Cerna-Motru-Tismana	Cerna-Jiu	169	416	Y
Herculane	Cerna	Cerna-Jiu	7	25	Y
Turceni	Jiu	Cerna-Jiu	6	20	-
Cornereva	Belareca	Cerna-Jiu	25	50	Y
Vadeni	Jiu	Cerna-Jiu	11	27	-
Tg. Jiu	Jiu	Cerna-Jiu	11	23	-
Voila	Olt	Olt-Vedea	14.2	29.1	Y
Vistea	Olt	Olt-Vedea	14.2	33.3	Y
Arpas	Olt	Olt-Vedea	14.2	36.4	Y
Scoreiu	Olt	Olt-Vedea	14.2	37	Y
Negovanu	Sadu	Olt-Vedea	27.5	54.5	Y
Vidra	Lotru	Olt-Vedea	510	1075	Y
Malaia	Lotru	Olt-Vedea	18	34	Y
Bradisor	Lotru	Olt-Vedea	115	228	Y
Gura Lotrului	Olt	Olt-Vedea	27	62	Y
Turnu	Olt	Olt-Vedea	70	194	Y
Calimanesti	Olt	Olt-Vedea	38	106	-
Daesti	Olt	Olt-Vedea	37	107	-
Rm. Valcea	Olt	Olt-Vedea	46	134	Y
Raureni	Olt	Olt-Vedea	48	141	Y
Govora	Olt	Olt-Vedea	45	135	-
Babeni	Olt	Olt-Vedea	37	120	Y
Ionesti	Olt	Olt-Vedea	38	125	Y
Zavideni	Olt	Olt-Vedea	38	120	-
Dragasani	Olt	Olt-Vedea	45	140	-
Strejesti	Olt	Olt-Vedea	50	173	-
Arcesti	Olt	Olt-Vedea	38	122	-
Slatina	Olt	Olt-Vedea	26	82	-
Ipotesti	Olt	Olt-Vedea	53	98	-
Draganesti	Olt	Olt-Vedea	53	106	-
Frunzaru	Olt	Olt-Vedea	53	104	-
Rusanesti	Olt	Olt-Vedea	53	104	Y
Vidraru	Arges	Arges	220	400	-

Table 5.12. continued

Hydropower Plant	River	River Basin	Electric Capacity (Mw)	Annual Production (Gwh/year)	Locks And Fish Pass
Zigoneni	Arges	Arges	15.4	28	Y
Vilcele	Arges	Arges	15.4	28.3	-
Budeasa	Arges	Arges	11.5	22.7	-
Golesti	Arges	Arges	8	33	-
Riusor	Tirgului	Arges	19	45.5	-
Mihailesti	Arges	Arges	8.1	13.6	Y
Pecineagu	Dimbovita	Arges	64	120	Y
Vacaresti	Dimbovita	Arges	4.8	7	-
Rogojesti	Siret	Siret	3.6	9.1	-
Bucecea	Siret	Siret	1.2	4.2	-
Galbeni	Siret	Siret	29.1	79	-
Racaciuni	Siret	Siret	45	113	Y
Beresti	Siret	Siret	43.5	108	-
Bicaz	Bistrita	Siret	210	434	-
Pingarati	Bistrita	Siret	23	57	Y
Vaduri	Bistrita	Siret	44	90	-
Piatra Neamt	Bistrita	Siret	11	52	-
Roznov I	Bistrita	Siret	14	61.5	-
Roznov II	Bistrita	Siret	14	61.5	-
Zanesti	Bistrita	Siret	14	63	-
Costusa	Bistrita	Siret	14	64	-
Buhusi	Bistrita	Siret	11	50	-
Racova	Bistrita	Siret	23	60	-
Girleni	Bistrita	Siret	23	61	-
Bacau I	Bistrita	Siret	23	56	-
Bacau II	Bistrita	Siret	30	74	-
Poiana Uzului	Uz	Siret	4.1	14	-
Stinca-Costesti	Prut	Prut-Birlad	15	65	-
Portile de Fier I+II	Dunare	Dunare	1266	6490	-

Table 5.13. The hydropower output, by year

Hydroelectric Power Output (GWh)		
Year	Total	Hydroelectric power
1989	75,851 (100%)	12,628 (16.6%)
1990	64,309 (100%)	10,980 (17.1%)
1991	56,912 (100%)	14,149 (25.0%)
1992	54,195 (100%)	11,700 (21.6%)
1993	55,476 (100%)	12,768 (23.0%)
1994	55,086 (100%)	13,042 (23.7%)
1995	57,800 (100%)	16,630 (29.0%)

Source: Environment Protection Strategy, Bucharest, 1996

Table 5.14. Hydroelectric plants by river basin in 1996

No.	River Basin	Total Number Of Hydroelectric Plants	Installed Power (MW)	Annual Energy (Gwh)
1.	Tisa	4	3.413	10.063
2.	Somes	25	335.580	410.935
3.	Crisuri	29	217.326	319.511
4.	Bega-Timis-Caras	16	168.465	208.116
5.	Nera-Cerna	8	7.796	15.879
6.	Jiu	16	191.992	260.800
7.	Olt	43	1,614.395	2,979.902
8.	Arges	28	519.252	704.592
9.	Ialomita	26	86.155	181.817
10.	Siret	88	730.923	2,269.544
11.	Prut	3	17.440	90.151
12.	Danube	3	1,320.000	8,072.459
13.	Litoral	2	10.000	0.422
TOTAL		291	5,222.737	15,524.191

5.1.5. River Fisheries (Danube and Main Tributaries)

The inland fisheries of Romania consist of both capture and culture fisheries. Capture fisheries in the main channel of the Danube focus on Black Sea shad (Alosa pontica), several species of sturgeon, common carp, catfish and other domestic fish species, as well as Chinese carp.

In the Danube Delta area the main target species are the crucian carp, catfish, common carp, zander, pike, perch and bream.

The main production area is the Danube and Danube Delta that has a floodplain of more than 9,000 km^2 within Romania. The fishery is based mainly on seine and trammels netting operations in the Danube and the end delta region. Fence traps are also built in lakes and reservoirs. Also, there is sport fishing in some of the small fish ponds in farms.

The majority of the fishing in the smaller rivers is sport fishing. There is an important sport fishery, for which 200,000 licenses were issued in 1995.

In the 1970's the Danube Delta supported a population of some 22,000 people. This has now declined to 15,000. This is partly due to a decline in the fishing opportunities in the area but also reflects the social and economic difficulties of operating in the area. Following preparation of plans for the economic development of the Delta in 1975, 11 fishing companies were formed to exploit the resources. There are currently reported to be about 1,300 full-time and 500 part-time fishermen operating through these companies in the Delta.

In addition there are about 200 family small-scale private operators who run fishing activities.

Pond culture has a long history in Romania, especially in the Transylvanian and Moldovian plains with fish being grown in irrigation ponds and associated with monasteries. It is only since the 1950s, however, that commercial farming has undergone substantial development.

This rapid development took place after 1965 to replace the natural lakes, ponds and wetlands from the lower Danube valley, which had been drained and transformed into agricultural land among 1950 and 1965.

Table 5.15 Annual fish production

Annual fish production (tones) by source												
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Freshwater (capture and farmed)	58,456	65,780	66,873	77,264	66,842	48,186	40,518	34,510	29,663	31,597	29,059	24,781
Black Sea	14,268	15,834	14,015	13,963	13,836	6,251	1,218	3,735	3,907	2,500	2,023	2,245
Distant Water	164,913	189,512	183,483	176,391	144,132	73,422	83,197	57,026	1,305	-	-	-
Total production	237,637	271,126	264,371	267,618	224,810	127,659	124,933	95,271	34,874	34,097	31,082	27,026

Source: Eastfish. Fishery Industry, vol. 11 (1997), Copenhagen

Table 5.16 Main fish species

Romanian annual production of main species by year (tones)											
Species	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Silver carp	10,870	12,977	20,986	14,340	13,858	11,868	9,982	8,979	8,508	8,694	8,604
Common carp	19,008	17,828	17,044	16,722	13,417	9,364	6,978	5,562	5,060	3,930	2,987
Bighead carp	6,323	7,283	8,000	11,872	7,321	6,885	5,448	4,947	5,203	2,628	1,421
Goldfish	17,690	14,270	20,069	12,751	4,173	5,682	5,968	5,335	5,430	4,581	4,295
Grass carp	1,218	3,011	9,100	3,597	3,478	2,889	2,644	1,797	1,560	418	284
Total these species	57,095	57,356	77,187	61,271	44,237	38,679	33,012	28,613	27,755	20,251	17,591

Source: Eastfish. Fishery Industry, vol. 11 (1997), Copenhagen

Table 5.17. Rate of unemployment in the fisheries sector

Total Employment in the Fisheries Sector										
Sub-sector	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total	10,862	13,074	7,785	14,304	16,504	15,310	11,720	8,400	7,497	6,997

Source: Eastfish. Fishery Industry, vol. 11 (1997), Copenhagen

The values of the catch are not available. It is very difficult to estimate a figure because the prices are very fluctuant from a day to another, there is a huge black market, particularly related to the Danube River and Danube Delta, and together with privatization the number of economic agents dealing with fishery activity has increase very much. For these reasons even at the central level there is not a real control concerning this activity.

5.1.6. River Shipping

Table 5.18. The evolution of river shipping transport

River Shipping					
1991	1992	1993	1994	1995	1996
Goods carried (million tones)					
8249	6198	7074	9405	14392	14142
Goods travel (million tones - km)					
2030	1890	1592	1896	3107	3774
Indices of goods travel 1990 = 100					
97.1	90.4	76.2	90.7	148.7	180.6
Passengers transported (thou passengers)					
1361	1124	868	1986	2042	2399
Passengers travel (million passengers - km)					
33	26	25	22	24	17
Indices of passengers travel 1990 = 100					
56.9	44.8	43.1	37.9	41.4	29.3

Because after 1989 there is a huge liberalization in the import/export trade activity information concerning the share of import/export via Danube are not available.

The harbors on the Danube River and waterways are presented in the Table 5.19.

Table 5.19. Capacity and type of goods to be transported

No.	Harbor	Type of goods	Harbor capacity (thousands tons/year)
Riverine-maritime harbors			
1	Sulina	general goods	300
2.	Tulcea-maritime	bulk goods	1,950
		general goods	190
	-riverine	bulk goods	1,050
		general goods	190
		total	3,380
3.	Galati –maritime	bulk goods	6,500
		general goods	5,040
	-riverine	bulk goods	14,200
		general goods	2,000
		total	27,740
4.	Braila-maritime	general goods	1,385
	-riverine	bulk goods	1,400
		total	2,785
			Riverine harbors
5	Chilia Veche (x)	general goods	-
6.	Mahmudia	bulk goods	3,700
7.	Isaccea (x)	general goods	-
8.	Macin	bulk goods	350

Table 5.19. continued

No.	Harbor	Type of goods	Harbor capacity (thousands tons/year)
9.	Gura Arman	bulk goods	700
10.	Turcoaia	bulk goods	700
11.	Harsova (x)	general goods	-
12.	Cernavoda	oil products	700
		bulk goods	700
		total	1,400
13.	Parjoaia (in construction)	bulk goods	1,200
14.	Calarasi	general goods	95
		bulk goods	1,590
		total	1,685
15.	Oltenita	bulk goods	525
16.	Giurgiu	oil products	1,000
		general goods	380
		bulk goods	1,050
		total	2,430
17.	Zimnicea	general goods	480
18.	Turnu Magurele	general goods	190
		bulk goods	525
		total	715
19	Corabia (x)	general goods	-
20.	Bechet (x)	general goods	-
21.	Calafat	general goods	95
		bulk goods	180
		total	275
22.	Cetate (x)	general goods	-
23.	Gruia	general goods	-
24.	Drobeta Turnu Severin (in construction)	general goods	190
25.	Gura Vaii	bulk cement	300
26.	Orsova	general goods	270
		bulk goods	590
		total	860
29.	Moldova Noua	bulk goods	350
30.	Moldova Veche	general goods	195
		bulk goods	180
		total	375
31.	Medgidia	bulk goods	540
32.	Basarabi	bulk goods	350
GENERAL TOTAL			51,530

5.1.7. Water Related Recreation/Tourism

Danube River is considered a major factor of national tourism, particularly because of the existence of Danube Delta. The Danube Delta is the second largest delta in Europe (after the Volga River Delta), covering, together with the Razim (Razelm)-Sinoe lacustrine complex, about 5800 Km^2 of lakes, marshes, channels, associated with beach ridges, littoral accumulative formations and predeltaic relics. Thus the delta region works as an environmental buffer between the Danube River and the western Black Sea, filtering the riverine pollutant supplies, collected from a vast drainage area, and transported in particulate phase and in solution.

The anthropogenic polluting activities developed in this huge river basin, the major regulation and hydrotechnical works achieved upstream, on the Danube River and its main tributaries, and the harmful human interference carried out inside of the Danube Delta area itself have disturbed the natural balance of the highly dynamic, but particularly sensitive, delta system. The over-development of the navigation, fish farming and agriculture, the intensive reed exploitation, and badly planning construction of artificial channels and dykes for polder farming and water flood control carried out during the last fifty years, damaged the delta's natural resources.

The decrease of the retention capacity, the alteration of the natural percolation of the water and the shift of the dispersal and distribution patterns of the sedimentary material inside the delta have increased the environmental degradation not only of the Danube Delta but even of the Black Sea.

Tourism has represented an important income source for the local people of some areas. The number of the visitors declined drastically from 140,000 in 1980 to 25,000 in 1993, but the great potential for developing ecotourism in the DDBR area and the improving of the infrastructure to the modern standards will ensure a normal development of this activity. Related to the international tourism, hunting is an important activity not only for the inhabitants, but for outsiders as well. Game hunting, poorly controlled ecologically before, is now organized and monitored by the Danube Delta Biosphere Reservation Administration across 14 hunting areas covering 1,435 Km^2

As was already stated, the over-development and the deficient management of some land use activities inside the delta have the potential to damage or modify the environment, with dangerous consequences for the biodiversity of this complex ecosystem. To those risks, a very important anthropic pressure is represented by the urban, domestic and transport activities of more than 300,000 peoples who live around but very close to the Danube Delta.

The Danube is a very important waterway, in fact being the only one for the Romania.

Concerning the bathing, the Danube River is used for this purpose, but not in an organized way, usually by the local communities alongside the river. The quality of the water is relatively good in the sector between the entry into the country and the confluence with Arges River and poor from this point to the discharge into the Black Sea.

Taking into account that the Danube River is used for a variety of purposes, including the drinking water, the quality of the raw water is not always and on all sectors suitable to fit the requirements.

Because water is an important factor for recreation within the Danube River Basin, there are presented the most important water related recreational areas.

Table 5.20. The most important water related recreational areas in 1996

No.	Recreation Area	River	Annual Number Of Visitors
1.	Toured Slain Baths	Vale Sarata	105,000
2.	Crisana Felix Swimming Place	Hidisel	10,000
3.	Mures Complex – Tg. Mures	Mures	285,000
4.	Carp Baths – Arad	Mures	490,000
5.	Neptun Swimming Place – Arad	Mures	850,000
6.	Lugoj Swimming Place	Timis	-
7.	Timisoara Swimming Place	Timis	-
8.	Sf. Gheorghe Recreation Lake	Olt	9,600
9.	Pitesti Swimming Place	Arges	372,000
10.	Floreasca Swimming Place	Colentina	94,560
11.	Herastrau – Bucharest	Colentina	572,850
12.	Tineretului Recreation Lake - Cimpina	Prahova	100,000
13.	Tintea Baicoi Baths	Underground	3,000
14.	Parcul Tineretului Swimming Place - Buzau	Buzau	40,000
15.	Baltatesti	Neamt	6,500
16.	Vatra Dornei	Bistrita	11,100
17.	Slanic Moldova	Slanic	78,300
18.	Stecaret Swimming Place	Milcov	20,000
19.	Municipal Swimming Place - Iasi	Prut	95,000
20.	Littoral	Black Sea	2,040,000
21.	Cojocna	Cojocna	9,000
22.	Appolo Felix	Hidisel	80,000

5.2. Projection of Expected Economic Significance/Impacts

5.2.1. Projection of Abstraction of Raw Water

According with the papers elaborated by the Water Management Romanian Institute in 1995, regarding the domestic use of water it has been estimated that after a period of population decrease will follow a moderate increase, with 0.04% per year at the entire country level. It was considered that, in accordance with the Water Management Strategy, the degree of population connected to the centralized water supply systems will increase from 85% in present to 99% in 2020, in the urban area, and from 19% in present to 85% in 2020, in the rural area. This will require an increase in water demand for population, which will be significant taking into account that will increase the degree of comfort. Concerning the industrial water demand it has been considered that, accordingly with the industrial branch strategies, new water supply sources are not necessary as the existing sources will satisfy the demands up to 2005. From 2005 it will follow a slow increase of 2% per year. At the same time it has been considered that together with the industrial reorganization the services sector will be improved.

Water for the irrigation purposes is assured for 3,0 million hectares and taking into account that all the irrigation systems will be rehabilitated the water demand will decrease. Beside these aspects, in present, there are available water sources for the irrigation of 360,000 hectares.

Table 5.21 Projection of total water demand (without losses reduction; millions m^3)

River Basin	2000	2010	2020
Somes-Tisa	479	610	762
Crisuri	360	480	577
Mures	1607	1744	2105
Bega-Timis-Caras-Barzava	381	477	562
Cerna-Jiu	782	867	961
Olt-Vedea	1059	1425	1788
Arges	1227	1510	1679
Ialomita-Mostistea-Buzau	742	911	1237
Siret	1024	1415	1698
Prut-Birlad	743	822	1238
Dobrogea	439	519	652
Dunare**	4282	5665	8462
TOTAL ROMANIA	13125	16445	21721

** Without losses reduction*
*** The values are given taken into account that the volumes of water for irrigation will increase and, by the year 2020 the second reactor of CNE Cernavoda will be operating.*

This projection is theoretical only, because it is very difficult to assess much more accurate the water demand in this period, taking into account the enforcement and impact of the new policy of the Romanian Ministry of Water, Forest and Environmental Protection aiming to the implementation of an economic mechanism in water management. This will include, without doubts, an important increase of the raw water price and will determine the decrease of the water consumption and water losses.

This aspect is very important, particularly in connection with the reorganization of the water sector and penetration of the private sector in this field.

5.2.2. Projection of Wastewater Discharge

In order to evaluate the projection of the wastewater discharge it has been used a percentage of 80% from the projection of water demand

Table 5.22. The projection of wastewater discharges *(*millions m^3)

River Basin	2000	2010	2020
Somes-Tisa	383	488	610
Crisuri	288	384	462
Mures	1285	1,395	1684
Bega-Timis-Caras-Barzava	305	382	450
Cerna-Jiu	626	694	769
Olt-Vedea	847	1,140	1430
Arges	982	1,208	1343
Ialomita-Mostistea-Buzau	594	729	989
Siret	819	1,132	1358
Prut-Birlad	594	657	990
Dobrogea	351	415	522
Dunare	3426	4,532	6770
TOTAL ROMANIA	10500	13,156	17377

The accuracy of these results is influenced by the reasons shown in the previous paragraph.

The most important aspect seems to be related on the qualitative issues. In this respect it should be underlined that a much higher attention will be given to the wastewater treatment before its discharge into the natural receivers (pre-treatment).

As a fundamental aim of its entire economic and social policy, Romania would like to join European Union. One of the most important objectives to be reached is the environmental legislation approximation, out of which, the water protection has a crucial role. Thus, in very short time (about 10-15 years) the treated wastewater volumes must be increased and the treatment facilities rehabilitated.

5.2.3. Projection of Other Major Impacts

There are some political factors affecting how enlargement of the EU will actually play out and what role environmental aspects will play in that process.

The environmental aspects of the enlargement bring with them their own special politics. A particular political concern within the EU seems to be that new members could be admitted under “easy” environmental terms. Taking into account that the “acquis” must be fully transposed and implemented at the time of accession, the main problem arisen is if Romanian has available financial resources necessary to comply to the new requirements.

It is clear that the effort made to reach environmental EU standards will lead to an improvement of the environment in general and particularly of the water resource quality. The question considered by the expert that may be a major impact is, if the Romanian economy has the power to sustain the technological effort required for the new development or assists to continuos decrease of the economic activity (mainly by elimination of the economic units) with dramatic consequences over the population.

6. Analysis of the Relevant Legal and Institutional Framework and its Adequacy for Sound Environmental Management of Water Resources and Eco-systems

6.1. Documentation and Short Analysis of the Relevant Legal Framework

Romania, as any other Central or Eastern European country is going through unique, political, economic, institutional and social transformations.

Through its activities, which include legislative and regulatory actions, revenue-raising and coordinating programs, Government makes or influences a huge number of decisions that ensure the implementation of the law, regulations and standards.

The legislation framework reflects the need to manage all the natural resources as part of an integrated strategy, which involve cooperation of all the relevant governmental agencies.

Water resources in Romania are administered according to the principles of *integrated water management*, which links water quality and water quantity, ground water and surface water, together with the environmental and economic considerations.

This link is important because of excessive abstractions into lower underground and surface water levels, thereby increasing contaminant concentrations and creating the same deleterious environmental effects as effluent discharges. Introduction of the integrated management approach represents the effective and economical management of natural resources as an integrated part of the social and economic development.

Introduction in the new Water Law 107/1996 of a river basin multipurpose approach to water management, which links social and economic development with pollution of natural ecosystem, integrates water quality and quantity aspects, balances the use of water covering different users and among different sectors in an economically optimal way.

Elaboration of *comprehensive river basin development and actions plans on a pilot basis* are being also considered as part of the ministry initiative and this concept is pursued for all catchments of the rivers. Immediate areas where this approach can have an impact are the design of a legislative framework, which reflects the objectives, and available natural resources of the Romanian Government.

In the water sector decision-making process there are several types of public participation that can represent options for public to be involved:

- development of water resources policies, strategies, laws
- elaboration of legislation;
- development of the strategy to implement the policies;
- elaboration of the environmental impact studies;
- permitting process for activities with environmental impact;
- local and basinal planning decision;
- enforcement of laws, regulations and permits;
- international waters;
- privatization of the water services;
- accidental pollution programs;
- water resources management plan during draughts periods;
- flood prevention and control projects.

In the past, consultation with the public has been very limited in the government decision process. For the last six years, the largest driving force behind public participation in Romania, which was identified by legal experts and observers, is the media. The media is becoming increasingly attentive towards water management issues, especially for water pollution. According to existing experiences, the water management authorities are aware of the benefits of public participation and generally include public participation in their decision-making even beyond the legal requirements

Due to the fact that the entire existing legislation and policy framework needed review, the involvement of many parties were very high. Decision on programmes and projects could benefit from sectoral policy framework and land use planning framework that at present are being reviewed; some are in the process of being developed. Public participation is one of the main concern of the decision-making factors in the water sector and how information can be more widely distributed to the public in a fashion more readily understood, and represents an important task both for the central and river basin authorities.

For an effective consultation to be carried out, several conditions were established by the MWFEP, through its Water Department developed in the Water Law and its regulation the participation plans conditions. These include: having an appropriate legislative framework, a local capacity to carry out the consultation, which means wide distribution of information before consultation begins, public notice and comment, adequate resources to organize public hearing, provision of feed-back on results of consultation process and social science expertise. The effectiveness of this system will be evaluated very soon, when the first River Basin Committees for three pilots starts operating and the accessibility to the information, the fairness of the decisions, and the understandability of the water users and the affected people will be assessed.

The *permitting process*, the heart of the regulatory system, incorporates both issuing permits and assessing charges and fines both for water consumption and for effluent discharges.

The 12 river basin branch offices of *Apele Române* issue permits based on the national water management strategy specifying the amount of water used or consumed, as well as the quantity and quality of effluents.

Water management *standards* include effluent standards that limit the amount or rate of discharges. Ambient water quality standards also exist. These standards provide some flexibility, because they allow facilities to choose, which technologies should be used to meet requirements.

While the concept of *compliance schedules* was developed to create feasible plans for polluters to reach compliance, in practice they have been used in the water sector to work with the enterprises to simply improve their performance. As such, it is an open question for analysis as to whether their use has actually slowed down full compliance.

Water charges exist in Romania and consist of prices for direct consumption (water as a “good”) and tariffs for discharges (water as a “service”). They were introduced at the start of 1991 by a Government Decision and rates are indexed quarterly.

Related to the legal framework of water resources management, the MWFEP has the following priorities:

- Promote new specific laws adding to the framework law on environmental protection harmonized with EU legislation.
- Improve cooperation between ministries, in view of drawing up an efficient legislation and of procedures to implement thereof.
- Institutionalize relationship with NGOs and the population.
- Improve existing standard system for environmental protection and attain EU level, in accordance with White Chart provisions on East-European countries preparation to the integration into the EU Internal Market.

6.2. Analysis of Relevant Institutional Framework

The Water Department located in the Ministry of Water, Forests, and Environmental Protection (MAPPM) regulates the water sector.

The Water Department supervises *Apele Române* (AR), a public utility with branches in each of the country's 12 river basins. AR is responsible for the management of 70,000 kilometers of rivers and 150 multi-purpose lakes and dikes. AR supplies 95% of the raw water to municipalities, industry, and agriculture.

Local government is responsible for municipal water supply and wastewater treatment.

For enforcement, the Water Department of MAPPM and AR can take legal action against non-complying facilities and levy fines and other sanctions — including closure — against violators.

Compliance is monitored in many ways. *First,* AR conducts routine plant sampling and inspections, including the review of the facility's records (enterprises are responsible for monitoring and reporting their discharges). While the number of inspections is planned, the timing of the visit is not known to the enterprise. *Second,* AR carries out unplanned plant visits, usually based on concerns raised from other inspections. *Third,* when an accident is reported, AR does an immediate inspection. *Finally,* through its ambient programme, AR also conducts periodic sampling from a series of sampling checkpoints along water bodies, both selectively for pollution-prone water bodies and according to predefined annual programs.

Local environmental protection agencies also carry out some limited water monitoring.

The key person in all water management is ***the actual consumer***. The present organisation of the Romanian water sector does not reflect this fully, as the water resources management and provision of raw water are separated from the actual provision of water and wastewater services, the latter being under the responsibility of the Municipalities and the Ministry of Public Works.

The present Romanian approach splitting the water resources management/raw water provision and the actual water services provision makes it more difficult to follow a demand driven approach, where the water organisations respond to a *demand* for services, and there is a large risk that service provision remains supply driven, with limited or no interest in water conservation and demand management at the raw water providers (there are no incentives to sell less water).

7. Description and Analysis of Actual Policies and Strategies

7.1. Actual Policies and Strategies

The policy of self-sufficiency at any cost adopted by Romania from the early 1980s exacerbated inefficiencies throughout the economy. This has led to intensity of energy use in Romania 3-5 times those of OECD countries. As a result, the environment has suffered serious degradation. The policies of growth with no regard to environmental costs are of the past. In view of the significant damage done to the natural environment, the Romanian government is committed to a development policy that integrates environmental considerations. Such a policy enables the conservation of natural resources, the avoidance of irreversible damage to the environment and the achievement of long term economic growth on a sustainable basis. Without such a development strategy, the cost of restoring the natural environment in the future will be prohibitively expensive. Moreover, in the long run, economic growth will decline with the continued use of the environment as a sink.

The introduction of policies that force producers to compete in open markets leads to restructuring away from heavy industries and towards less polluting lighter industries and services. Favorable impacts on the environment come from price liberalization and removal of subsidies, privatization, competitive markets, reform of taxation, interest and exchange rates. The impacts of these policy changes can be seen in the down-sizing of operations in a number of enterprises and outright closures for reasons of unacceptably high inefficiencies, low competitiveness and pollution impacts. It is therefore imperative that prices of energy, other industrial inputs, water, forestry and other natural resources be maintained at economic levels. Besides the removal of subsidies, the elimination of barriers to both domestic and foreign trade plays an important role in attaining and maintaining input prices to their economic levels. The Romanian Ministry of Water, Forests and Environmental Protection is currently promoting policy initiatives aimed at:

- Integrating the environmental policies related to water and air pollution, noise, waste management, nature conservation and climate change within a coherent and cost-effective framework;
- Integrating the environmental policies within the general framework of structural adjustment policies.

The necessity of an integrated environmental strategy is the consequence of the requirements Romania has to deal with to the end of achieving the ambitious goal of European integration. The essence of the integrated environmental management finds its expression in the design and the implementation of economic policies both in the water and forestry sectors. By addressing the problems of the above-mentioned sectors in accordance with the principles of the integrated approach, the conflicts between the economic, the social and the environmental goals of the development are minimized. The need for an overall strategy has been imposed by the today's market place that demands a continuous reliable supply of high quality product.

The actual *Romanian Water Management Strategy* is based on some key principles related to the insurance of sustainable development of the aquatic environment:

- All the legitimate requirements for water must be met. The drinking water supply should not be constrained by lack of water.
- The strategy is considering the importance of water as a valuable resource and as an economic asset.
- Better use of existing water resource to meet forecast demand through demand management and water conservation measures for all categories of water use, agricultural and other.

Priority problems identified in the field of environmental protection are approached in a unified manner in the *Environmental Protection Strategy of Romania* developed by the Ministry of Water, Forests and Environmental Protection.

The following principles and general criteria have been adopted upon setting the objectives: preservation of human health conditions; sustainable development; avoiding pollution through preventive measures; conservation of biodiversity; preservation of cultural and historical heritage; "polluter pays" principle; protection against natural calamities and accidents; maximum cost/benefit ratio; adherence to International Environmental Protection Conventions and Programmes provisions.

The objectives will be obtained through two scenarios that take into considerations share of the gross domestic product (GDP), which is to be allocated for investments in the field of environmental protection. *Scenario A*: maintaining present rate of investments of about 0.6% of GDP. Expected effects: reduction before the year 2010, as against reference year 1989, of SO2, CO, NH4 emissions by 20 - 30%, heavy metals by 80%, ozone depleting substances by 100% and constant maintenance of CO2; considerable improvement of surface water quality; increase of forest surfaces from 27% to 28% of the country's surface etc. *Scenario B*: doubling investments by about 1.2% of GDP. Expected effects of Scenario A are to be obtained 5-6 years earlier. Scenario A is considered to be more realistic for the present stage of social-economic development, then in the future, as financial resources increase, to pass to Scenario B. National Environmental Action Programme (NEAP) aims at putting into practice the major objectives of the Strategy as well as at adopting the general Environmental Action Programme for Central Eastern Europe (CEE) to the specific conditions of Romania.

The general Environmental Action Programme represents the framework document adopted by the Ministerial Conference of Lucerne, Switzerland, and April 1993. The costs for carrying out NEAP projects will be covered by the state budget, enterprises own contributions and foreign sources. The State will be the main sponsor for those projects aiming at works of ecological restoration or of other nature, which will lead to the elimination and reduction of negative effects of some past situations. The owner of the economic units will cover the clean-up cost.

The development and introduction of *new regulation and rules* to control and diminuate water pollution from point and non point sources has aimed to propose and implement stricter measures for pollution prevention, based on a better integration of the concept of sustainable integrated management with sustainable economic development.

This new legal framework facilitated the use of several policy instruments, including environmental permits and licenses, user charges, pollution charges, subsidies, legal environmental liabilities and other appropriate economic instruments.

The legislation framework should reflect the need to manage all the natural resources as part of an integrated strategy, which involves cooperation of all the relevant governmental agencies.

The Romanian government recognizes the challenges involved in implementing economic instruments aimed at addressing the environmental problems. The Ministry of Waters, Forests and the Environment approved the Environmental Action Programme in accordance with the LUCERNE model. The programme provides the guidelines for the targeted national strategies and the policy actions of greatest benefits in the short and the long run.

The programme emphasizes the necessity and the emergency of feasibility studies aimed at implementing economic instruments, including on the basis of the international experience. Presently, the Romanian government is more than willing to take bold steps in introducing economic instruments both in the environmental and the water sectors.

Having the framework *Environmental Law no. 137/1995, the Water Law 107/1996*, several *regulations* including a recent proposal on self-financing of EPA, Romania is at a crossroad in its efforts to create an **environmental sustainable development and market economy**.

7.2. Sector Policies

The achievement of the desired balance between development and human needs and the environment imposes also an equitable and clearly defined sharing of duties and responsibilities.

Introduction of the integrated management approach represents the effectively and economically management of natural resources as an integrated part of the social and economic development. The essence of the integrated approach found expression in the formulation and the implementation of economic and sectoral Romanian environmental and water management policies, in the coordination of the planning and management activities concerned with all the users of waters by examining in an integrated manner in order to minimize conflicts and to link social and economical development with environmental protection and helping to achieve the objectives of sustainable development.

The existing environmental policy is based on cost effectiveness in the short run due to financial constraints and it shell realistically be extended towards a long term sustainable scenario as economy improves.

For the *agricultural sector*, the actual environmental policy takes into account the general diffuse nature of the pollution from agriculture as well as the often considerable time lag in the transfer of pollutants to ground water. The efforts should mainly concentrate on the following:

- to adopt agricultural policy-such as natural resources (water, soil) conservation and practices- such as modernized irrigation practices- to meet environmental objectives, by maintaining the basic natural processes;
- to identify options for remedial actions for reduction of pollution from agriculture run-off- non point sources, for restoring and protecting surface and ground water degraded by agricultural pollutants and minimizing soil erosion;
- to determine the consequences of changing land use pattern;
- to develop agriculture preservation and promote conservation policies in the countryside and reconciling this with modern agriculture practices;
- to guide agriculture privatization in terms of environmental effects, by developing new institutions and technologies that respond to farmers needs for higher quality services;
- to implement the best management practices correlated with control of water pollution, drainage and salinity control, including the decreasing of the input of chemical to the point that the equilibrium between the nutrients and the carrying capacity of soils is maintained;
- to promote a new incentive scheme, as a part of Government policy for the future, to ensure farmers can meet environmental challenges- conservation of resources, conservation and management of existing natural habitat.

Privatization can be considered as an adjustment strategy. In Romania, it is most advanced in agriculture, where the ownership rights were restored for about 80% of the cultivable land.

The interface between agriculture and water industry is an interesting one and complex one covering a wide range of issues. The spectrum runs from abstraction limits, rural water supplies, resources development, regional water transfer, quality issues- pesticides, nitrates-, trade effluent discharges and sludge disposal, finally to pollution control associated with livestock and highly polluting farm wastes.

Different instruments can control this interface. Economic instruments between affected parties are a sensible way to control. Also, price control regulated by water industry economic regulator.

The increased adverse impact on the aquatic environment from non point sources imposes the need for active involvement of environment and agricultural authorities in the planning and authorized of all development, in order to anticipate, assess and take measures to mitigate likely ecological effects of their planned activities.

Experience during the last years has proved that remedial measures and activities must be incorporated in the early stages of the conceptual, planning and design projects.

The industrial sector policy should take into account the economic environmental improvements. Methods to evaluate the environmental damages in economic terms are improving, although a large number of damages remain hard to quantify and evaluate. Development and progress in privatization and property rights over the past few years will modify the industrial policy. Enforcement problems with enterprises that remain state owned should be clarified. Price liberalization is still in place in a number of areas relevant for water and environmental policy, areas such as transport, energy supply, and water and waste management services.

The basis for the water service strategies should be the household's preferences since ultimately households will have to pay, through higher user fees and local taxes, for improvements in the existing system.

The correlation between sectoral policies are based on the following considerations:

- the *ecosystem approach* which will take into account both demand for water resources and also the effects on the ecosystem of particular levels of demand;
- the existence of a fully effective and comprehensive *database*;
- the existence of *public involvement and participation;*
- a strong *flow of information* between all the interested implied;
- a need for a high degree of public *education.*
- the planning and decisions making process should be on a *long term perspective*; *equal opportunity for participating* in identifying solutions for disputes and conflicts between users;
- *flexibility* of the making-decision process;
- the involvement of the public;
- *accountability* to the making-decision process of all the parties involved.

Inter-agency coordination and collaboration is essential for the best multiple use and management of the natural resources.

This implies the *change in a fundamental way of the attitude and policy* regarding the water management and environment.

Annexes

Annex 1

Biological Resources

Biological Resources

In Romania, the flora and fauna dissemination are conditioned by relief and pedo-climatic elements, being located in steps.

The plain

The plains, below 300m altitude, occupy the west (West Plain), the south (Romanian Plain, Dobrogea Plateau) and the south-east (south of Moldavia) of the country.

The plain area includes the grazing lands in silvosteppe, the steppe, salted soils and sands. The most part of plain is occupied by crops. The natural flora and fauna is reduced, most of the species being in danger.

The flora is represented by: poppy (Papaver dubium), field peony (Paeonia tenuifolia), mushroom (Agaricus arvensis), Salsola kali, carthusian pink (Dianthus carthusianorum), Euphorbia nicaeensis, Prunus spinosa, trefoil (Medicago lupulina), bromegrass (Bromus inermis), Hordeum murinum, Xanthium spinosum, Paliurus spina-christi, jasmine (Jasminum fruticans), Daucus carota, Salvia nemorosa, Acinus arvensis, chicory (Cichorium intybus), Agropyron pectiniforme, dandelion (Taraxacum officinale) etc.

Fauna is poor: Zebrina varnensis, locust (Calliptamus italicus), cricket (Gryllus campestris), beetle scarab (Scarabeus affinis), cockchafer (Anoxia villosa), large cabbage white (Pieris brassicae), gadfly (Tabanus autumnalis), turtle (Testudo hermanni), steppe lizard (Lacerta taurica), partridge (Perdix perdix), bustard (Otis tarda), sparrow (Passer montanus), ground squirrel (Citellus citellus), hamster (Cricetus cricetus), hare (Lepus sp.), Putorius putorius etc.

The forest

The forests have a large extent. There are willow forests in Danube Delta and poplar forests in floodplains. In silvosteppe area the wooden vegetation is dominated by different species of ***oak tree***: Quercus pedunculiflora, Quercus pubescens, Hungarian oak (Quercus frainetto), Turkey oak (Quercus cerris) and others trees associated.

In plain and hills areas the species of Quercus robur mixed with others species are prevailing. Higher, the evergreen oak (Quercus petraea) grow, in pure or combined forests. These types of forests include trees such as: hornbeam (Carpinus betulus), elm (Ulmus minor), common ash (Fraxinus excelsior), linden (Tilia cordata, Tilia tomentosa), sycamore maple (Acer platanoides); bushes like: hawthorn (Crataegus monogyna), Cornus sanguinea, cornel (Cornus mas), and different herbaceous plants: Melica uniflora, Brachypodium silvaticum, Festuca altissima, Genista tinctoria, Galium schultesii, Euphorbia amygdaloides, Amanita muscaria etc.

Animals, like oak glis (Eliomys quercinus), wolf, fox, hedgehog, pheasant (Phasianus colchicus), hoopoo (Upupa epops), nightingale (Luscinia), titmouse (Parus), woodpecker, Falco subbuteo, Carduellis carduellis, Lacerta viridis, Lucanus cervus, Lymatria dispar and many others, inhabit the oak forests.

Beech forests cover the hills and the mountains between 500 - 1400 m altitude. The dominant species is the ***beech tree*** (Fagus sylvatica). In beech forest, linden (Tilia cordata), mountain sycamore (Acer pseudoplatanus), common ash (Fraxinus excelsior), rowan tree (Sorbus aucuparia)

may also be found. The bushes are: Spiraea ulmifolia, Lonicera xylosteum, filbert (Corylus avelana), blackberry bush (Rubus hirtus). The herbaceous vegetation is represented by Asperula odorata, wild strawberry (Fragaria vesca), Symphytum cordatum, Atropa belladonna, fern (Dryopteris filix-mas), Morchella esculenta, Lecanora subfusca etc.

Among oak and beech forests there are hay fields, glades, grasslands, orchards, vineyards etc.

The beech forest is the shelter of many animals: stag (Cervus elaphus carpathicus), bear (Ursus arctos), lynx (Lynx lynx), squirrel (Sciurus vulgaris), Martes martes, wild boar (Sus scrofa), Tetrastes bonasia, Turdus viscivorus, jay (Garrulus glandarius), Accipiter gentilis, Aquila pomarina, tree frog (Hyla arborea), salamander (Salamandra salamandra), Stauropus fagi, Melolontha sp., Daudebardia transsylvanica.

Spruce (Picea abies) is the dominant species in the resinous forests which cover the mountains at more than 600 m, up to 1600 m. Beside spruces there are growing: Swiss pine (Pinus cembra), larch tree (Larix decidua), birch tree (Betula pendula), mountain sycamore (Acer pseudoplatanus), Populus tremula. Among trees there are Lonicera nigra, Sambucus racemosa, Rubur idaeus, bilberry (Vaccinium myrtillus), Monotropa hypopitys, Luzula albida, Campanula abietina. The mosses (Polytrichum commune, Dicranum scoparium, Hylocomium splendens) and the lichens (Usnea barbata) may also be found.

The resinous forests are populated with: bears, roebucks, foxes, Sicista betulina, capercaillie (Tetrao urogallus), Lyrurus tetrix, crossbill (Loxia curvirostra), blackbird (Turdus merula), other birds, reptiles, invertebrates like gasteropods (Vitrea diaphana, Retinella pura, Ena montana), butterflies (Lymantria monacha, Dendrolimus pini), coleopterans (Tetropium castaneum, Monochamus sartor), Crypphalus piceae, Anthaxia quadripunctata, Pineus pini etc.

Alpine area

On the mountains peaks the vegetation is represented by juniper tree (Pinus mugo), Juniper sibirica, Vaccinium myrtillus, Bruckenthalia spicufolia, Salix reticulata, dryas (Dryas octopetala), edelweiss (Leontopodium alpinum), bellflower (Campanula alpina), crosswort (Gentiana verna). The animals are less represented. Black goat (Rupicapra rupicapra), Microtus nivalis, some birds - hedge sparrow (Prunella collaris), mountain creeper (Tichodroma muraria), big predator birds included, like eagle (Aquila chrysaetos), lamb vulture (Gypaetus barbatus), Aegypius monachus, Gyps fulvus, viper (Vipera berus), water salamander (Triturus alpestris), gasteropods (Pupilla alpicola, Columella edentula), coleopterans (Carabus silvestris transsylvanicus, Nebrina gyllenhali) are some of these animals.

Water and wetlands areas

In the lakes, pools, swamps, springs, brooks, rivers and wetlands the flora may be represented by: algae, water lily (Nymphaea alba, Nuphar luteum), water spike (Potamogeton natans), water caltrop (Trapa natans), Salvinia natans, frog food (Lemna trisulca, Lemna minor), hornwort (Ceratophyllum demersum), Vallisneria spiralis, water plantain (Alima plantago-aquatica), Sparganium erectum, rush (Phragmites communis), bulrush (Typha latifolia), sedge (Carex riparia), Equisetum arvense, Dryopteris cristata, Sphagnum magellanicum, Mnium punctatum, alder tree (Alnus glutinosa), osier (Salix fragilis, Salix purpurea), white willow (Salix alba), Caltha laetha, Myosotis scorpioides, Veronica longifolia, Mentha aquatica etc.

Aquatic and wetlands fauna is represented by: sponges (Spongilla lacustris), worms (Polycelis felina, Tubifex tubifex, Hirudo medicinalis), lamellibranchiates (Anodonta cygnea, Unio pictorum, Dreissena polymorpha), gastropods (Theodoxus danubialis, Viviparus viviparus, Limnea stagnalis, Radix ovata), crustaceans (Daphnia galeata, Cyclops sp., Asellus aquaticus, Rivulogammarus balcanicus, Astacus astacus), insects (Perla sp., Libellula quadrimaculata, Nepa cinerea, Notonecta

glauca, Dytiscus marginalis, Culex pipiens, Erystalis tenax). The waters are populated with: trout (Salmo trutta fario), huck (Hucho hucho), dace (Leuciscus cephalus), barbel (Barbus meridionalis), carp (Cyprinus carpio), perch (Perca fluviatilis), pike (Esox lucius), loach (Misgurnus fosilis), Gobio gobio, grayling (Thymallus thymallus), bream (Abramis brama), sturgeons etc. We also mention water salamander (Triturus cristatus), frog (Rana ridibunda), water turtle (Emys orbicularis), water snake (Natrix tesselata), diver (Podiceps cristatus), big cormorant (Phalacrocorax carbo), heron (Ardea cinerea), pelicans, swans, egrets, moor hen (Fulica atra), lapwing (Vanellus vanellus), ducks, gooses, blue gull (Alcedo athis ispida), tern (Chlidonias niger), wagtail (Motacilla flava), water rat (Arvicola terrestris), muskrat (Ondrata zibethica), otter (Lutra lutra).

Danube Delta

Danube River has built a land with a great variety of habitats at its mouth, flowing into the Black Sea. The Danube Delta, one of the most valuable place in Europe, was designated as a natural biosphere reserve in 1990. The scientists identified here 20 different types of natural habitats.

Almost 400 freshwater lakes of varying size, broad reed beds, white willow forests, ash-oak forests and sand dunes are the main components of the Danube Delta landscape. This mosaic of biotops shelters a diversity of wildlife.

After a preliminary investigation, the number of species living in the delta was estimated as being nearly 5000. The specialists identified 1514 species of plants, 3063 species of invertebrates and 325 species of vertebrates. Many of these species were found for the first time in the Delta (130 species of plants, 398 of invertebrates), some were new for Romania (10 species of plants, 97 of invertebrates and 2 of vertebrates) and 19 species have been described as being new for science.

Due to the diversity of ecological conditions, the Danube Delta vegetation has a very large spectrum of associations, from aquatic and marsh plants to extremely dry, steppe plants.

Together with other marsh plant, reeds form the dominant plant community of the area. With over 180.000 ha of almost compact reed beds, the delta holds the largest extent of this habitat in the world.

Increased levels of nutrients in the Danube have been, in every summer, the cause of extensive blooms in lakes and channels with still water. This phenomenon led to a dramatic reduction in the submerged vegetation of many lakes. Only those, like Erenciuc, Belciug and Rotundu, being slightly connected to the main stream, still show a submerged vegetation which once was typical for the whole area.

Four of the aquatic plants living here are protected: Angelica palustris, Aldrovanda vesiculosa, Trapa natans and Salvinia natans.

In the coastal area of the delta unique dune forests are draped with abundant creepers, including two of mediterranean origin: Periploca graeca and Vitis sylvestris, giving the forest a tropical appearance.

The Danube Delta shelters 3400 species of invertebrates and vertebrates. The group represented best are the insects, with over 2224 species. Among these, 237 have been described for the first time in this area, 45 are new for Romania and 13 species have never been seen before by a specialist.

The second largest group are the worms with 411 species. A quarter (101 species) has been described for the first time in the delta area, 37 species are new for Romania and four are new for science.

The third most numerous group of animals are birds, with over 300 species, 176 of them breeding here. But the real importance of the delta for birds consists in the presence of the greatest part of the world population of rare species like pygmy cormorant (Phalacrocorax pygmaeus) - nearly 60% - and red breasted goose (Branta ruficollis). The biggest delta bird is the common pelican (Pelecanus onocrotalus).

The Danube Delta provides vital habitats for 184 bird species, strictly protected.

Among the 64 fish species found here over the last years, two are new for romania and one is new for science. The following species may be found here: sterlet (Acipenser ruthenus), stor sturgeon (Acipenser stellatus), Danube mackerel (Alosa pontica), sheat fish (Silurus glanis), common sturgeon (Acipenser guldenstaedti), marine sturgeon (Huso huso).

To ensure the diversity of wildlife in Danube Delta and its conservation for future generations, scientists introduced the principle of zonation of the area. Some of these core areas are: Sahalin-Zatoane (21410 ha), Rosca-Buhaiova (9625 ha), Letea (2825 ha), Periteasca-Bisericuta-Portita (4125 ha), Popina (98 ha) etc. Others areas like Babina islet, Pardina island, Holbina etc were declared areas for ecological reconstruction.

The Main Romanian Reservations (protected areas)

The reservation	Type of reservation	Area (ha)
1. Alba county		
Iezerul Surianu	complex (the lake, the lake flora and fauna, the around area)	20.0 ha
Iezerul Ighielului	complex (the lake, the lake flora and fauna, the around area)	500.0 ha
Sesul Craiului	Floristic	225.7 ha
Padurea de larice de la Vidolm	dendrological	91.5 ha
Molhasurile Capatanii	floristic (the swamps, flora)	13.0 ha
2. Arad county		
Lacul Bezdincomplex	(the lake, the lake flora and fauna, around area)	25.0 ha
Dosul laurului de la Zambru	dendrological, floristic	31.0 ha
Runcu-Grosi	floristic	248.0 ha
Padurea Prundu Mare	wetland/faunistic	16.6 ha
Padurea Plesa	dendrological	173.7 ha
3. Arges county		
Rezervatia Iezer-Papusa	complex (geological, floristic, swamps)	1,200 ha
Valea Valsanului	faunistic	17.0 ha
Cheile Dambovicioarei si Cheile Brusturetului	complex (geological, floristic)	150.0 ha
Poienele cu narcise de la Negrasi	floristic	32.0 ha
Parcul dendrologic de la Mihaiesti-Muscel	dendrological, floristic	57.5 ha
4. Bacau county		
Padurea Slanic Moldova	dendrological, floristic, faunistic	571.0 ha
Parcul dendrologic Hameius	dendrological, floristic	47.5 ha
Dealul Perchiu	floristic	90.6 ha
Parcul dendrologic Dofteana	dendrological	25.7 ha
Padurea Runc	floristic	57.5 ha

5. Bihor county

Lacul si paraul Petea de la Baile 1 Mai-Victoria	the thermal lake, floristic	4.0 ha
Defileul Crisul Repede	complex (geological, faunistic, fossilic)	220.7 ha
Cetatile Ponorului si Valea Galbenei	complex (geological, floristic)	92.3 ha
Saritoarea Bohodeiului	complex (geological, floristic)	174.6 ha
Molhasurile din Valea Izbucelor	wetland	80 ha
Cetatea Radesei	floristic	20 ha

6. Bistrita Nasaud county

Rezervatia Valea Repedea	complex (geological, floristic, faunistic)	222.0 ha
Taul Zanelor	wetland	1.5 ha
Parcul dendrologic Arcalia	floristic	15.94 ha

7. Botosani county

Stanca Stefanesti	complex (floristic, geological)	1.0 ha
Rezervatia de tisa de la Tudora	dendrological	124.7 ha
Turbaria de la Desca	wetland	10 ha
Padurea Vorona	dendrological, floristic, faunistic	151.6 ha

8. Brasov county

Masivul Bucegi	complex (geological,dendrological,floristic, faunistic)	1588.0 ha
Rezervatia Piatra Craiului	complex (geological, floristic, faunistic)	1459.2 ha
Rezervatia Tampa	complex (geological, dendrological, floristic, faunistic)	1203.0 ha
Padurea si mlastinile de la Prejmer	dendrological, wetland, floristic	30.0 ha
Dealul Cetatii-Lempes	dendrological, floristic	274.52 ha
Poiana cu narcise de la Dumbrava Vadului	floristic	391.9 ha
Mlastina de la Dumbravita Barsei	wetland, floristic	0.5 ha
Mlastina de la Stupini	wetland, floristic	5.0 ha

9. Braila county		
Padurea Viisoara	dendrological	1693.6 ha
Insula mica a Brailei	wetland, faunistic	5336.0 ha
10. Buzau county		
Rezervatiile din Muntii Siriu	complex (lakes, floristic,dendrological)	275.0 ha
Padurea Spataru	dendrological, floristic	150.0 ha
Padurea Frasinu	dendrological, floristic	158.0 ha
Padurea Milea-Viforata	dendrological, floristic	134.0 ha
11. Caras-Severin county		
Rezervatia Cheile Nerei-Beusnitacomplex	(geological, dendrological, floristic, faunistic)	3368.0 ha
Cheile Carasului	complex (geological, floristic)	894.5 ha
Rezervatia Valea Mare	dendrological, floristic	488.0 ha
12. Calarasi county		
Padurea Cionuleasa	dendrological, floristic	73.2 ha
Padurea Tamadau	dendrological, floristic	35.0 ha
13. Cluj county		
Rezervatia Cheile Turzii	complex (geological, floristic, faunistic	175.7 ha
Izvoarele Somesului Cald	complex (geological, floristic)	6490.3 ha
Fanetele de la Suatu	floristic	9.2 ha
Fanetele Clujului	floristic	7.5 ha
Lacul si Valea Legiilor	ornithological	20.0 ha
Lacul Stiucii	ornithological	25.0 ha
Lacul Geaca	ornithological	25.0 ha
Stufarisurile de la Sic	faunistic	2.0 ha
14. Constanta county		
Masivul Cheia	complex (geological, floristic)	285 ha
Rezervatia Fantinita-Murfaltlar	floristic	19.7 ha
Dunele litorale de la Agigea	floristic	25.0 ha
Padurea Hagieni	Dendrological	207.4 ha
Padurea Dumbraveni	dendrological, floristic	345.7 ha

Grindul Chituc-Golovita-Smeica	complexe (floristic, faunistic)	900.0 ha
Istria-Nuntasi	wetland, floristic, faunistic	120.0 ha
Lacul Techirghiol	floristic, faunistic	10.0 ha
Canaraua Fetii	faunistic	168.3 ha
15. Covasna county		
Muntele Puciosu-Turia	complex (geological, floristic, faunistic)	4.9 ha
Mestecanisul de la Reci	floristic, wetland	14.0 ha
Tinovul Luci	wetland, floristic	120.0 ha
Turbaria Apa Rosie	wetland, floristic	25.0 ha
16. Dambovita county		
Rezervatia Zanoaga	dendrological, floristic	983.3 ha
Tinovul de la Laptici	wetlands, swamps, floristic	1.5 ha
Izvoarele de la Corbii Ciungi	floristic, faunistic	5.0 ha
Padurea Cocora si Cheile Horoabei	complex (geological, dendrological, floristic)	367.2 ha
17. Dolj county		
Rezervatia ornitologica de la Ciupercenii Noi	wetland, ornithological	500.0 ha
Padurea Ciurumela de la Poiana Mare	Dendrological	8.0 ha
18. Galati county		
Padurea Breana	dendrological, floristic	88.3 ha
Dunele continentale de la Hanu Conachi	floristic, faunistic	199.3 ha
Padurea Garboavele	dendrological	100.0 ha
19. Giurgiu county		
Padurea Comana	dendrological, floristic	438.5 ha
Padurea Manafu	dendrological, floristic, faunistic	83.3 ha
20. Gorj county		
Padurea de castani de la Pocruia-Tismana	dendrological	32.4 ha
Cheile Sohodolului	geological, floristic	20.0 ha
Cheile Oltetului	geological, dendrological, floristic	20.0 ha

21. Harghita county		
Lacul Rosu si Cheile Bacazului	complex (geological, floristic, faunistic)	960.8 ha
Lacul Sfanta Ana	geological, floristic, wetland	78.4 ha
Mlastina de la Valea Mijlocie	swamp, floristic	4.0 ha
Mlastina de la Sancraieni Ciuc	swamp, floristic	1.0 ha
Mlastina “Dupa Lunca”	swamp, floristic	40.0 ha
Tinovul Mohos	wetland, floristic	40.0 ha
22. Hunedoara county		
Lacul Calcescu	complex (wetland, geological, floristic)	2.0 ha
Parcul National Retezat	complex (geological, floristic, faunistic)	2700.0 ha
Padurea Bejan	dendrological	42.0 ha
Parcul dendrologic Simeria	dendrological	70.0 ha
Padurea de stajar de la Chizid	dendrological	129.0 ha
Padurea Slivut	dendrological, floristic	506.0 ha
21. Ialomita county		
Padurile Caiafele si Moroiu	floristic, faunistic	478.9 ha
22. Iasi county		
Fanetele de la Valea lui David	floristic	50.0 ha
Padurea Uricani	dendrological	68.0 ha
Padurea Humosu	dendrological	73.3 ha
Padurea Roscani	dendrological	34.6 ha
23. Ilfov county		
Lacul si padurea Snagov	complex (lake, dendrological, floristic, faunistic)	1727.0 ha
Padurea Caldarusani	dendrological, floristic	468.0 ha
Padurea Raioasa	dendrological, floristic	54.8 ha
24. Maramures county		
Rezervatia Naturala Pietrosul Mare	complex (geological, floristic, faunistic, glacial lakes)	3300.0 ha
Arboretele de castan de la Baia Mare	dendrological	500.0 ha
Padurea de stajar de la Bavna	dendrological	26.0 ha
Mlastina Poiana Brazilor	swamp, floristic	4.0 ha

Lacul Morarenilor	wetland, lake, floristic	20.0 ha
Rezervatia Cornedei-Ciungii Balasinii	faunistic	800.0 ha
Gorunetul de la Ocna Sugatag	dendrological	44.0 ha
Gorunetul de la Ronisoara	dendrological	62.0 ha
25. Mehedinti county		
Rezervatia Cazanele Dunarii	complex (geological, dendrological, floristic)	115.0 ha
Padurea de liliac de la Ponoare	floristic	20.0 ha
Padurea Starmina	dendrological	100.0 ha
Gura Vaii-Varciorova	floristic	303.9 ha
Rezervatia Valea Cernei-Domogled	complex (geological, floristic, faunistic)	10,000.0 ha
26. Mures county		
Padurea Mociar	dendrological	48.0 ha
Rezervatia de la Zau de Campie	floristic	3.0 ha
Padurea Lapusna	dendrological	62.0 ha
Parcul dendrologic Gurghiu	dendrological	48.0 ha
Lacul Faragau	faunistic	35.0 ha
27. Neamt county		
Muntele Ceahlau	complexe (geological, floristic, faunistic)	4,073.2 ha
Padurea Vanatorii Neamtului	dendrological	70.6 ha
Parcul dendrologic de la Valeni	dendrological	3.0 ha
Padurea Gosmanu-Tarcau	dendrological	171.3 ha
28. Olt county		
Padurea Topana	dendrological, floristic	144.0 ha
Padurea Seaca-Optasani	dendrological	218.9 ha
Padurea Calugareasca	dendrological	58.0 ha
Rezervatia Boianu	ornithological	350.0 ha
29. Prahova county		
Muntii Bucegi	complex (geological, dendrological, floristic, faunistic, glacial complex)	3849.8 ha
Padurea Glodeasa	dendrological	347.0 ha

Aninisul de la Sinaia	dendrological, floristic	1.37 ha
Padurea Cocoresti-Mislii	dendrological	75.0 ha
Padurea Plopeni	dendrological	10.7 ha
30. Satu Mare county		
Mlastina si dunele de la Vermes	wetland, floristic	60.0 ha
Gradina Cailor	floristic	10.0 ha
31. Salaj county		
Balta Cehei	wetland, floristic, faunistic	36.0 ha
32. Sibiu county		
Lacul si golul alpin Balea	complex (wetland, glacial lakes, floristic)	120.4 ha
Iezerele Cindrelului	complex (glacial lakes, faunistic)	450.5 ha
Dealul Magura	floristic	11.5 ha
Padurea Arpasu	dendrological	36.4 ha
Tinoavele de la Lunca Prigoanei	wetlands, floristic	8.0 ha
33. Suceava county		
Rezervatia Muntii Calimani	complex (geological, dendrological, floristic, faunistic)	350.0 ha
Muntii Rarau-Pietrele Doamnei	complex (geological, floristic, faunistic)	887.9 ha
Padurea Valea Putnei	dendrological	283.0 ha
Codrul Slatioara	dendrological	854.3 ha
Fanetele Bosanci-Frumoasa	floristic, faunistic	14.0 ha
Fanetele Bosanci-Ponoare	floristic, faunistic	24.5 ha
Rezervatia Lala-Bila	complex (geological, dendrological, floristic, faunistic)	1,000.0 ha
Tinovul de la Poiana Stampei	wetlands, floristic	677.1 ha
Padurea Demacusa	floristic, faunistic	238.6 ha
Codrul Giumalau	dendrological	314.2 ha
34. Timis county		
Parcul Bazos	dendrological	64.4 ha
Saraturile de la Dinias	floristic	5.0 ha
Padurea Cenad	dendrological, floristic	314.0 ha
Mlastinile de la Satchinez	wetlands, floristic, ornithological	74.0 ha

35. Tulcea county

Rezervatia Biosferei Delta Dunarii	complex (lakes, wetlands, dendrological, floristic, faunistic)	5,912 ha
Padurea Valea Fagilor de la Luncavita	dendrological	154.2 ha
Padurea Babadag	dendrological	300.0 ha

36. Vaslui county

Padurea Harboanca-Brahasoaia	dendrological	69.5 ha
Padurea Balteni	dendrological	22.0 ha
Padurea Badeana	dendrological	126.7 ha
Padurea Valea Urii	dendrological	100.0 ha
Padurea Calinesti	dendrological	365.0 ha

37. Valcea county

Rezervatia Muntii Coziei	complex (geological, waterfalls, floristic, faunistic)	4462.0 ha
Rezervatia Calinesti	dendrological	365.0 ha
Rezervatia Valea Urii	dendrological	60.0 ha
Padurea Latorita	dendrological	71.0 ha

38. Vrancea county

Rezervatia Reghiu-Scruntaru	complex (geological, floristic)	125.0 ha
Padurea Tisita	dendrological	307.0 ha
Padurea Lepsa-Zboina	dendrological	220.0 ha
Padurea Cenaru	dendrological, floristic	383.2 ha
Padurea Schitu-Dahauti	dendrological	190.0 ha

The Major Protected, Endemic and Relict Romanian Plants

1. Yew tree (Taxus baccata)
1. Swiss pine (Pinus cembra)
2. Cypripedium calceolus
3. Angelica (Angellica archangelica)
4. Edelweiss (Leontopodium alpinum)
5. Yellow gentian (Gentiana lutea)
6. Romanian peony (Paeonia peregrina var. romanica)
7. Glober-flower (Trollius europaeus)
8. Spring adonis (Adonis vernalis)
9. Little almond tree (Amygdalus nana)
10. Mottled tulip (Fritillaria maleagris)
11. Thistle (Ruscus aculeatus)
12. Nigritella nigra
13. Nigritella rubra
14. Fern (Dryopteris cristata)
15. Juniperus sabina
16. Corylus colurna
17. Betula nana
18. Carthusian pink (Dianthus carthusianorum)
19. Saponaria glutinosa
20. Species of tropical lily (Nymphea lotus var. thermalis)
21. Saxifraga demissa
22. Saxifraga mutata
23. Pyrus elaeagrifolia
24. Astragalus depressus
25. Astragalus peterfii
26. Onobrychis gracilis
27. Sand bindweed (Convolvulus persicus)
28. Periploca graeca
29. Ligularia sibirica
30. Yellow lily (Lilium jankae)
31. Narcissus (Narcisus angustifolius)
32. Alchemilla dolichotoma
33. Andryala levitomentosa

34. Anthemis tinctoria
35. Campanula romanica
36. Centaurea phrygia subsp.rarauensis
37. Cerastium transsilvanicum
38. Cochlearia borzaeana
39. Dianthus giganteus subsp.banaticus
40. Draba dorneri
41. Festuca bucegiensis
42. Galium bailloni
43. Hepatica transsilvanica
44. Ornithogalum orthophyllum subsp.acuminatum
45. Papaver corona-sancti-stephani
46. Salvia transsilvanica
47. Saxifraga mutata subsp.demissa
48. Silene dinarica
49. Sorbus dacica
50. Thlaspi dacicum subsp.banaticum
51. Zannicellia prodanii
52. Syringa josikaea
53. Betula humilis
54. Salix starkeana
55. Viola epipsila
56. Pedicularis sceptrum carolinum
57. Achillea impatiens
58. Lycopodium inundatum
59. Drosera rotundifolia
60. Harpathus flotowianus
61. Sphagnum balticum
62. Mnium cinclidoides
63. Helodium lanatum
64. Bucegia romanica
65. Dichelyma falcatum

The Most Important Protected, Endemic and Relict Romanian Animals

1. Freshwater Romanian fish (Romanichtys valsanicola)
2. Trout (Salmo trutta fario)
3. Huck (Hucho hucho)
4. Dobrogea turtle (Testudo graeca ibera)
5. Oltenia turtle (Testudo hermanni hermanni)
6. Sand snake (Eryx jaculus turcicus)
7. Esculap snake (Elaphe longissima)
8. Sand lizard (Eremias arguta deserti)
9. Viper (Vipera ursinii renardi)
10. Birch tree cock (Lyrurus tetrix)
11. Capercaillie (Tetrao urogallus)
12. Raven (Corvus corvus)
13. Bustard (Otis tarda)
14. Big egret (Egretta alba)
15. Little egret (Egretta garzetta)
16. Swan (Cygnus olor, Cygnus cygnus)
17. Spoon bill (Platalea leucorodina)
18. Pelican (Pelecanus onocrotalus, Pelecanus crispus)
19. Himantopus himantopus
20. Heron (Ardea cinerea)
21. Laxius excubitor
22. Swallow (Hirundo rustica)
23. Serpent eagle (Circaetus ferox)
24. Buzzard (Buteo buteo, Buteo lagopus)
25. Falco (Falco subbuteo)
26. Circus macrourus
27. Circus pyargus
28. Pernis apivorus
29. Kerstel (Falco tinnunculus, Falco vespertinus)
30. Vulture (Neophron percnopterus, Haliaetus albicilla)
31. Pandion haliaetus
32. Gyps fulvus
33. Aegypius monachus
34. Kite (Milvus milvus)

35. Eagle owl (Strix aluco, Strix uralensis)
36. Rearmouse (Vespertilio pipistrelus, Vespertilio serotinus)
37. Myotis myotis
38. Miniopterus schroibersi
39. Rhinolophus ferrume quimun
40. Black goat (Rupicapra rupicapra)
41. Lynx (Lynx lynx)
42. Bear (Ursus arctos)
43. Bison bonasus
44. Deroceras geticus
45. Daudebardia transsylvanica
46. Daude hardia rufa getica
47. Monacha vicina
48. Vitrea transsylvanica
49. Trichina transsylvanica
50. Pseudoalinda montana
51. Carabus obsoletus carpaticus
52. Nebria transsylvanica
53. Trechus carpathicus
54. Isophia haozi
55. Erebia pharte romaniae
56. Eupolybotrus transsylvanicus
57. Euscorpius carpathicus
58. Triturus montandoni montandoni
59. Dugesia gonocephala
60. Ilyodromus olivaceus
61. Macrotrachela musculosa
62. Adicella filicornis
63. Tartarothhyas romanica
64. Amara erratica
65. Argynnis pales arsilache

Annex 2

Statistical Evaluation Concerning the Functioning of the Wastewater Treatment Plants in 1996 on the River Basins

Statistical Evaluation Concerning the Functioning of the Main Wastewater Treatment Plants in 1996 on the River Basins

No	River Basin	Existing waste water treatment plants					In construction
		Total	Suitable operation		Unsuitable operation		
			number	%	number	%	Number
1	TISA	36	27	75.0	9	25.0	-
2	SOMES	257	189	73.5	68	26.5	1
3	CRISURI	72	25	34.7	47	65.3	-
4	MURES	353	194	55.0	159	45.0	7
5	BEGA-TIMIS	91	51	56.0	40	44.0	-
6	NERA-CERNA	15	13	86.7	2	13.3	-
7	JIU	65	25	38.5	40	61.5	6
8	OLT	113	37	32.7	76	67.3	4
9	VEDEA	13	1	7.7	12	92.3	-
10	ARGES	74	5	6.8	69	93.2	-
11	IALOMITA	59	11	18.6	48	81.4	-
12	SIRET	150	37	24.7	113	75.3	11
13	PRUT	78	3	3.8	75	96.2	4
14	DANUBE	34	11	32.4	23	67.6	-
15	LITTORAL	27	5	18.5	22	81.5	-
TOTAL		1437	634	44.1	803	55.9	33

Annex 3

Statistical Evaluation Concerning the Functioning of the Main Wastewater Treatment Plants in 1996 on the National Economy Activities

Statistical Evaluation Concerning the Functioning of the Main Wastewater Treatment Plants in 1996 on the National Economy Activities

No	ECONOMIC ACTIVITY	Existing waste water treatment plants					In construction
		Total	Suitable work		Unsuitable work		
			number	%	number	%	Number
1	Livestock farms	126	24	19.0	102	81.0	2
2	Irrigation	23	17	73.9	6	26.1	-
3	Forestry	7	6	85.7	1	14.3	-
4	Pisciculture	2	1	50.0	1	50.0	-
5	Mining industry	213	126	59.2	87	40.8	1
6	Food industry	139	52	37.4	87	62.6	1
7	Textile industry	36	12	33.3	24	66.7	-
8	Wood processing industry	52	29	55.8	23	44.2	-
9	Polygraph	1	1	100.0	-	-	-
10	Chemical processing	100	35	35.0	65	65.0	-
11	Metal works and machinery	115	46	40.0	69	60.0	2
12	Electronics	2	-	-	2	100.0	-
13	Transport means production	6	1	16.7	5	83.3	-
14	Furniture industry	19	5	26.3	14	73.7	-
15	Power generation	27	17	63.0	10	37.0	-
16	Municipal water supply	246	97	39.4	149	60.6	16
17	Constructions	46	37	80.4	9	19.6	-
18	Trade and services	22	16	72.7	6	27.3	-
19	Transports	67	45	67.2	22	32.8	-
20	Communications	1	-	-	1	100.0	-
21	Research-development	7	1	14.3	6	85.7	-
22	Public administration	55	11	20.0	44	80.0	11
23	Health and education	83	36	43.4	47	56.6	-
24	Other activities	42	19	45.2	23	54.8	-
GENERAL TOTAL		1437	634	44.1	803	55.9	33

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Part B

Financing Mechanisms

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List of Abbreviations

BCR	benefit cost-ratio
CBA	cost benefit analysis
CF	cash flow
ERBD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EU	European Union
GD	Government Decision
IRR	Internal Rate of Return
KHF	Know How Fund
MWFEP	Ministry of Waters, Forests and Environmental Protection
MAF	Ministry of Agriculture and Food
MH	Ministry of Health
MIT	Ministry of Industry and Trade
MPW	Ministry of Public Works
MUDP	Municipal Utilities Development Programme
NCW	National Council of Waters
NCNAC	National Commission for Nuclear Activity Control
NTP	Net Present Value
NEAP	National Environmental Action Plan
NGO	Non Governmental Organization
RAAR	Self-Managed Company «Romanian Waters»
SCNE	State Commission for Nuclear Energy
WWTP	Wastewater Treatment Plant

1. Summary

The present report is based on the relevant data provided by the main actors involved in the environmental field (namely Ministry of Waters, Forests and Environmental Protection and Self-Managed Public Company «Romanian Waters»).

The prices and tariffs are related with actual legislation in force, equivalent in USA $ are based on the exchange rate of 8478 ROL for 1$.

Assessment of Main Deficiencies and Needs for Improvement are based on the expert's evaluation.

In this way, I would like to emphasize the core problems regarding the legislation, the prices and tariffs system.

As regards the legal harmonization in the field of water administration, during 1999 the process of transposing the standards concerning the analysis methods will continue.

Unfortunately, this framework law has not been upgraded with legislation dealing with specific aspects of environmental protection.

In addition, enforcement of the legislation is rather poor because:

- lack of incentives,
- poorly defined property rights,
- old and wasteful production technologies,
- low public environmental awareness (although participation of NGOs in the process of the development of environmental policy is increasing)
- lack of financing and human resources.

According to the GD (Governmental Decisions) 1001/90 the following taxes to be paid by natural or legal persons discharging pollutants by their wastewater into surface waters complying with the authorization, as it follows:

- Suspended matter and dissolved substances mentioned in the given authorization (including nutrients, detergents, etc): 5376 ROL/ton of pollutant (0,63$ at the exchange rate of 8478 ROL)
- Oxygen consuming substances: 21746 ROL/ton of pollutant (2,56$)

For exceeding the authorized conditions penalties are applied.

The water price has to be brought to its real value. This will be negative for beneficiaries, especially now when the economic situation is difficult.

It is estimated that the maintaining of the unique price divided by sources and beneficiaries will produce a smaller impact than divided prices.

The agriculture was much more advantaged by the establishing of a small price (the value of the water usage is smaller then industry one), that was not indexed as the industry one was.

This aspect is difficult, because the impact of the establishment of a correct price for irrigation water will be much more then the industry one.

At present, it is using a very small quantity of water for the agriculture, although the yearly water price per ha is equal.

The updating of the prices depending on the inflation and the decrease of the water volume used by the consumers led in time to collections which do not cover the entire expenses in the system.

The penalties collected to Water Fund have not been updating since 1993, therefore their value does not function to stop the pollution tool. Even that, the penalized consumers do not pay the penalties value, departing from the law.

Equalizing the price level with the necessary one, so it covers both the exploitation (operation) and capital increasing, the user possibility or wish to pay will be smaller.

In order to size up these prices and tariffs we have to check their correctness and to improve the present system, because the costs necessary to be covered are much bigger then the effective cashing.

For example, the tariffs for evacuation cover only the costs for water quality monitoring, and for the administration ones. The prices used for the raw water reflect neither the marginal cost of the producer (water administration authority) nor the marginal cost of the consumer (opportunity cost) or the characteristic feature of water: its rarefies.

I have to point out that this price system made possible to consider the water as a public good with economic value, a very rare situation even in a very developed country; it was based on the fact that the water resources are a complex system on national level, which includes the surface and underground waters as the quantity and quality. The base unity is the watershed.

The tariffs for water supply, that the final customers (private households, public organization, industrial and agricultural enterprises) is the same namely 1585 ROL/m3 (0,18 $ at the exchange rate 1 $=8478)

The penalties collected to Water Fund have not been updating since 1993, therefore their value does not function as a preventative pollution tool. Even that, the penalized consumers do not pay the penalties value, departing from the law.

Equalizing the price level with the necessary one, so it covers both the exploitation (operation) and capital increase, the user possibility or wish to pay will be smaller.

Overall, Romania will have to place higher priority on environmental issues, significantly increase related finance and develop its administrative and financing capacity. A considerable effort must be made to develop adequate implementation and enforcement structures. Public awareness with regard to the environment field must be stimulated.

External technical and financial support is needed for implementing of the proposed projects, for applying advanced water treatment technologies, training and procurement of new equipment.

In the water supply and wastewater sector, a very substantial volume of investment is needed to reverse the deterioration of infrastructure, raise service levels and improve compliance with environmental standards.

A coherent programme of measures is required impacting on the institutional relationship between central and local government. The measures required include changes in the legislative framework to promote credit financing of locally government, as well as practical programmes building competence in the implementation of local managed investment programmes, and in the operational and financial management of water companies and local government.

2. Legal Basis

2.1. Compilation of Relevant Laws and Regulations with Financial Relevance to Water Quality and Water Management Programmes and Projects

The relevant Romanian laws:

a. Law on the environmental protection- No.137/December 29, 1995, was published in the Official Gazette of Romania, Part I, No. 304/ December 30, 1995

b. Water Law.

1. The principles and strategic elements that lay at the base of the law on the environmental protection for the purpose of assuring a sustainable development are the following:
   - Principle of precaution in decision-making;
   - «Polluter-pays» principle;
   - Developing international collaboration to ensure the quantity of the environment, etc.

   According to this law, environmental protection shall be an obligation of the central and local public administration authorities as well as of all natural and legal persons. The environmental protection authorities shall conduct the permitting procedures and shall issue environmental agreements and permits, which have a maximum five years, validity. The environmental protection authorities shall cash the sums obtained from the fees for the issue of environmental agreements and permits. The quantum of the fees shall be established by a decision of the Government, upon the proposal of the central environmental protection authority.
2. (1) Water represents a natural resource having an economic value, in all its forms of use. The conservation, reuse and saving of water shall be encouraged through economic incentives, inclusively for those, which demonstrate a permanent concern for protecting the quality and quantity of water, as well as through implementing penalties to those, who waste and pollute the water resources.

   (2) The specific economic mechanism for the quantitative water management shall include the payment system, allowances and penalties as part of the financing practice of the water management system development and ensuring the functioning of the Self-Managed Public Company «Romanian Waters» based on economic principles.

   (3) The methodology of substantiating the payment system in the water field, as well as the procedure for its elaboration shall be established by the Ministry of Waters, Forests and Environmental Protection, with the agreement of the Ministry of Finance.

   (4) The payment system stipulated in paragraph (2) is based on the precept: *the beneficiary pays*, according to the provided services and to those services related to the rational use of water resources, which ensure:
   a. Economic stimulation of the sustainable water use and of the water quality protection;
   b. Territorial differentiation of prices and tariffs, on categories of sources and users, as result of the different water supplying conditions, as long as the system can ensure balanced incomes and expenditure;

c. Correction of the level of prices and tariffs depending on the general dynamics of prices;
d. Transmittal to the users of economic influences resulted from the activities of providing water sources, from the quantitative and qualitative point of view;
e. Minimization of production costs, through economic stimulation of the price, for the purpose of ensuring the maximum social profit;
f. Reflection of the water flow and volume demand into the water prices.

Art. 81

(1) The payment system, the allowances and penalties specific to the water management activity shall be implemented to all water users.

(2) The provisions of paragraph (1) shall not be applied to the water transited for navigation, on the artificial navigable ways, as well as to the natural persons using the water, pursuant to Art. 9, paragraph (2).

(3) The Self-Managed Company «Romanian Waters» shall be the only supplier of water directly drawn-off from surface water sources, natural or artificial, regardless of the holder of any title of the structure, and from underground water sources, except for the geothermal waters, as well as of products and services specific to water management, on the basis of agreement concluded for this purpose.

(4) For the activities mentioned in paragraph (3), the Self-Managed Public Company «Romanian Waters» shall be the only one entitled to implement the payment system, specific to water management activity.

(5) For the treated supplied water, or for water management services, other than specific ones, the supplier or performer shall be those juristic or natural administration of hydraulic works or perform water management services.

Art. 82

(1) The allowances shall be granted to those water uses that shall demonstrate a permanent concern for the rational use and for the protection of water quality, discharging together with the treated wastewater pollutants of concentrations and in quantities that are smaller than those stated in the water management license.

(2) The penalties shall be applied to those water users, for which violations are found from the provisions of the agreements stated in Art. 81, paragraph (3), from exceeding both the quantities of drawn-off water, the concentrations and quantities of discharged pollutants.

(3) The Self-Managed Public Company «Romanian Waters» is the only authority entitled to identify the cases, for which allowances shall be granted or penalties shall be applied. The allowances shall be granted with the approval of the Ministry of Waters, Forests and Environmental Protection.

Art. 83

The system of payments, allowances and penalties, as well as the categories of water management products and services shall be established by governmental decision.

Art. 84

(1) For the purpose of participating in the financing of the investments for works and measures with a significant contribution to the improvement of the insurance of the water supply sources, to the water quality protection, as well as to the expenditures required for studies and appreciative researches in the water field, a special fund, not included in the state budget, called the *Water Fund,* shall be constituted.

(2) The Water Fund comprises the taxes and tariffs for the permitting and licensing services, established according to the law, as well as the penalties stipulated in Art. 82, paragraph (2).

(3) The Water Fund is managed by a separate budget, developed by the Self-Managed Public Company «Romanian Waters», and approved by the Ministry of Waters, Forests and Environmental Protection, which establishes also the methodology for the forming of this budget, with the agreement of the Ministry of Finance.

(4) the Water Fund, together with other sources, shall be used for the financial support of:

a. the accomplishment of the National System for Quantitative and Qualitative Water Resources Surveillance;
b. the endowment of laboratories, transmissions and informational networks related to the National System for Quantitative and Qualitative Water Resources Surveillance;
c. the participation for the realization and modernization of the wastewater treatment plants and installations in order to improve the quality of the water resources;
d. the accomplishment of public works of local interest with a significant social effect, and for which the local authorities do not have sufficient financial resources;
e. the accomplishment of public works regarding the prevention and control of floods, works of intervention, prevention and control of natural calamities caused by the excess or lack of water;
f. the provision of the hydrological informational operative decision-making system in the water management field;
g. the elimination of destruction's or the safety of the hydraulic structures of national or local interest, such as dams, embankment, etc.;
h. the accomplishment of protection works of the river basins against clogging;
i. the accomplishment of studies for the purpose of identifying the evolution and administration of the water resources;
j. the granting of allowances for those with significant results in the protection against the depletion and degradation of the water resources;
k. Basin committee activities.

Art. 85

The financing of investments regarding water management works, structures or installations shall be ensured, totally or partially, as appropriate, from:

a. The state budget or local budgets, for works declared of public utility, pursuant to the law;
b. The water users' funds;
c. The development fund of the Self-Managed Public Company «Romanian Waters»;
d. Funds obtained through credits or issue of bonds, guaranteed by the Government or the local public authorities, for the works of public utility or for partnership associations wishing to carry out such works;
e. The Water Fund.

2.2. Assessment of Main Deficiencies and Needs for Improvement

The legacy of environmental problems has been left by decades of heavy industrialization, with inefficient enterprises paying little attention to the output of contaminants. As a result, Romania faces severe environmental problems, with particular challenges in all key areas - water supply, solid waste management, and airs and soils pollution.

The state of water resources raises many concerns. The quality of drinking water is poor; connection rates to sewage treatment plants are low as is the standard of treatment and ground water pollution is extensive. Nitrates resulting from agriculture cause much of the water pollution in Romania. The serious pollution problems of the Danube originate less from Romania than is lead to believe; nevertheless, measures protecting the Delta should be initiated. Solid waste is another area of concern, as waste management legislation is almost non-existent, the concept of hazardous waste has not been defined and incineration is only intermittently practiced. As far as air pollution is concerned, it is also of large proportions, the main source of emissions being thermo-power stations, industrial complexes, especially for heavy metals, motor vehicles and heating. Following this uncontrolled emission, excess sulphur particles in the atmosphere has introduced the acid rain problem in Romania.

On the positive side, Romania has some of the most important and last remaining natural forests in Europe. Natural or semi-natural ecosystems cover 43 per cent of its territory. The government recognizes this and has taken measures aimed at protecting the environment. A National Biodiversity Strategy and a National Environmental Action Plan (NEAP) have been prepared while a framework law on environmental protection consistent with EU directives and regulations in this area, was adopted in 1995. Unfortunately, this framework law has not been upgraded with legislation dealing with specific aspects of environmental protection. In addition, enforcement of the legislation is rather poor because, among other reasons, lack of incentives, poorly defined property rights, old and wasteful production technologies, low public environmental awareness (although participation of NGOs in the process of the development of environmental policy is increasing) as well as the lack of financing and human resources.

On the whole, very little has been done so far in the field of EU approximation of environmental legislation. The situation is particularly serious in solid and hazardous waste management, where, as mentioned above, legislation is almost non-existent. Actual implementation and enforcement of the environmental Acquis is even further away and would necessitate:

(i) massive investment by the government, enterprises and international development partners and
(ii) the development of adequate implementation and enforcement structures.

In transforming the NEAP from plan into action, the government will initiate the following actions and policy measures:

(i) to enhance environmental regulation, and move more quickly towards EU standards,
(ii) to reduce industrial pollution,
(iii) to improve wastewater and solid waste management, especially in large municipalities,
(iv) to establish a National Environmental Fund, financed partly by pollution taxes and partly by the state,
(v) to implement the new privatization law which requires investors to provide either financial guarantee or a commitment to meet environmental standards, and
(vi) to promote public awareness on environmental issues.

For more information please see:

- Annex 1 Environmental policies, short term 1998
- Annex 2 Environmental policies
- Annex 3 Timetable for the legislative approximation in environmental protection in the period 1998-2000

3. National Policy and Strategy for Funding of Water Sector Programmes and Project

The analysis of the 1996-1997 period

The Romanian water resources have a relative limited character and are unevenly distributed both in time and space. In this context there is a need to satisfy now and in the future the water needs for the population and economy, as well as to protect these against the destructive effects of the water. That made the water administration activities to continuously develop both institutional and legal as well as from the water construction works point of view.

In 1996 the Law 107 for water was promulgated. This law brought new principles such as «the polluter pays» public decision on water administration, tax system, tariffs, penalties and bonuses, the right to have access to water administration information.

A Minister for Water, Forest and Environmental Protection approved the application procedures for the Law 107/1996 enabling that Romanian general principles and policies to be harmonized with EU.

These refers to:

- Organization by hydrographic basins;
- Authorization for works on water or related to it;
- Short, medium and long term planning;
- Protection against destructive effect of waters;
- Introductions of economic mechanism in the field of waters;
- International co-operation regarding the transboundary waters.

We can mention that the recent approval of norms NTPA 001 (regarding the pollution of wastewater send into the water resources) and NTPA 002 (regarding the pollution of waste send into the sewage system) means the practical enforcement of Directive 91/271/EEC regarding the evacuation of wastes.

In 1997 it was drafted the restructuring programme for the RAAR, in view of separating the economic and regulatory activities.

It is to mention the fact that the difficulty to adapt is not due to tough limits or new indicators, but to the capacity of treatment plants to maintain and attain them, and due to the lack of equipped laboratories capable to analyze and detect other quality indicators than those presently in use.

As regards the international co-operation, we can mention that the activity within the Danube Basin environmental programme continued, as well as the co-operation with France, USA, Netherlands, EEC/ONU and EU. Romania signed a new agreement with Ukraine on transboundary waters.

Objectives and measures in 1998

1. Regarding the water administration sector based on the law 107/1996, the system of issuing authorizations and avis for water administration is working well. The basis for this system is the framework schemes for the administration and works on the hydrographic basins, updated in 1994.

   It is proposed that this year at the same time with the restructuring of Autonomous Regis «Romanian Waters», to establish basin Committees with main regulatory attribution in the field of water administration. These committees will also enable the public participation to the decisions.

2. A very important aspect for the water administration activity is the reduction of accidental pollution.

   During 1997, the workers in the water administration field were monitoring the potential polluters in the process of drafting the plans for prevention and combating the accidental pollution. The process of updating the water use will be doubled by timing plans for those units, which do not meet the authorization conditions.
3. Approved in 1997 the Government decision no. 101 states special norms and regulations regarding the character and size of sanitary protected areas, in order to protect the water sources from surface or underground waters. These norm are applied from the design phase and are correlated with the law 98/1994 regarding establishing and sanctioning the contravention to the public health and hygiene norms.
4. Taking into consideration the limited amount of available water resources in Romania, the water is used many times for the same watercourse. Even in present there are 1437 wastewater treatment plants, out of which 248 for the domestic used wastewater, only 44,1 % are functioning within the regulated limits. In this context, there is a need of both administrative and investment measures to have all the treatment plant functioning within the efficiency limits established by the Directive 91/271/EEC, which means the achievement of a wastewater treatment of 70-90 % at the emission. Due to the evacuation of wastewater from industrial into the sewage system, it is necessary to increase the efficiency degree of the existing treatment plants or build more new ones. The 171/1997 Law, section II water, for the national territory arrangement, foresees for each county, the necessary works for the expansion of the sewage networks and respective treatment plants. These works will need a high financial effort, and in 1998 it is envisaged to finance the works al treatment plants, which were previously financed with EBRD load (such as the treatment plant from Iasi).
5. As stipulated by the law 107/1996 and the minister's order 281/1997 and 182/1997, the public has access to the water administration information and is involved in the decision taking process referring to this field. This access is made through the Basis Committees, whose members are also representatives of NGOs, water users and local public administration. At the same time, every one who ask for a water administration permits has to make public its intention to develop works or activities on water or related to water.
6. As it was already specified, the water is a condition for economic development, as can be a imitative factor, the social comfort increase and the economy being able to develop only in the measure, in which water administration grows, that fact implying investments, which at their turn need available resources in economy. Due to the size of investment, the water administration is a field, which needs a short and mostly long term planning, the investment being necessary before the water crisis occurs. The international practice shows that even if water administration works belong to the public sector, the costs are widely distributed for all the beneficiaries. In USA, the most privatized country, the water protection works, the water course regulation, complex works (water supplies, industry, energy) are established and approved by the Chamber of Representatives and are financed by the federal budget. In order to speed up the approval one seeks to reduce the funds requested from the federal budget by the participation of member states budgets, local authorities or even private companies. The financial resource will be limited a certain period of time due to the social and economic changes and to the transition costs; the budget investments, for the public sector will be also limited, and out of this, just a small part could be allocated for water administration. The consequences of this aspect are the followings:
   - Any new economic development should previously check whether it is possible or not to do the appropriate water administration investments;

- The new consumers should be located only in areas with available water resources;
- The available funds for the water administration will have to be used as efficient as possible;
- Involve local beneficiaries and economic agents to cover the costs.

7. The rational use of water and its relation with the environmental protection and with the sustain development, is one of the principal element of the European strategies and policies for the water resources administration, being also included into Romania's Europe Agreement.

   As regards the legal harmonization in the field of water administration, during 1998 the process of transposing the standards concerning the analysis methods will continue.

   The upgrading and modernisation works have an important place in the achievement of objectives mentioned in the water administration strategy. This means using new materials for adduction pipes and distribution networks, replacing the steel used until now, and also new water procedures for the treatment of water in view of making it drinkable and waste water treatment. It also means the use of new modulated treatment plants for small or isolated localities. Now in Romania, the use of centralized water supply system is no longer allowed without the simultaneously achievement of a sewage and wastewater treatment systems. We can mention at the action to ensure water supply and centralized systems by microregional grouping.

   All these action are developed in parallel with the rehabilitation of existing water and sewage systems.

Water Administration Strategy till 2005

Taking into consideration all that and in order to achieve the strategy objectives through the development programmes included in the Water administration strategy till 2005, the following works were analyzed and proposed:

- Water supply and rehabilitation for the sewage and water supply system existing in urban centers;
- Provision of water sources in view of extension of water supply system in rural areas, including the rehabilitation of existing ones;
- Floods prevention;
- Assurance of population health and ecology requirements;
- Water supply for irrigation;
- Improvement and protection of water quality;
- Hydroenergetic works development.

The Water Administration Strategy has three variant for investment: 45,340, 67,827 and 108,144 billions lei corresponding to a minimal, medium and maximal option.

Taking in consideration the actual status of water administration and works as well as the necessity to develop them mostly the need to assure the population water supply and it was proposed the adoption of the Programmes in its third form, because:

The largest part of the 29,000-km length of distribution networks is between 30 and 70 years old and is made of unprotected steel. This lead to water leakage in the network up to 40-45%. In comparison, these leakages in other countries are 5 to 8 times smaller: Netherlands - 5, France 10%. Only in 1994 there was a leakage of approx. 640 millions cubic meters of water (20 cubic meter/s), which did not reach the consumers, but was paid by them with approx. 130 billions lei. A similar situation is present for the industrial water networks.

a. In order to eliminate these losses two tips of solution were analyzed for the three Programme variants:

   To supplement the water resources in such a way that those losses be covered by new works to assure resources;

   The rehabilitation of centralized water systems.

   The first variant - which foresee the rehabilitation of 15 % of the length of the network in the next 15 years, the value of the works is 25,570 billions lei, whilst the value of works for the coverage of water losses needs investment of 20,090 billions lei.

   The second Programme Variant - 24 % of the network would be rehabilitate in 10 years, with an investment effort of 43,833 billions lei, and respective 50,225 billions lei.

   In the third variant, 41 % of the network will be rehabilitated with 70,315 and respectively 87,666 billions lei.

   We have to mention that supplementing the water resources could compensate the rehabilitation of the network within 15 to 19 % of their length. Any rehabilitation above that limit will lead to small part of the supplemented debits to reach the consumers, and the network will have no improvements from the actual situation.

   Based on all that, the Strategy for water administration chosen the variant with a rehabilitation of 41 % of the length in 10 years, figure which keeps the water loses to approx. 32% compared to the 7-10 % of the EU member states.

b. In order to reduce the floods, the works were selected on the basis of the report between the value of damages avoided by those works and the corresponding investment. As the damages produced by floods are due to debits with various probabilities, it was made a calculation over 30-40 years with an actualization of both investment and annual running costs, as well as of damages, using average rates in this case. If this rapport is more than one the work is considered economically viable.

   Some works, even non-economically viable, according to the aforementioned criteria, due to their social character, have to be done.

   The programme was analyzed in four variants of volume of work. One can notice that it is limit of average annual damage, to which correspond a value for the investment and annual running costs. This limit is 1831 billions lei/year, and irrespective to the increase of works volume, the average annual damage is practically constant. Based on that the third variant was proposed.

c. The quality of drinking water, at the source, especially for rivers but sometimes even for underground sources, is one of the causes of lack of water for the population. The sources were polluted by the industrial exhausted waters and by the untreated or insufficient domestic water wastes. That is why small towns had to use water sources located at great distances - 40-60 Km (Rm. Vilcea, Medias, and Bacau a/o).

   In this context, the Programme has three variant of volume of works in view of water quality improvement, by nominating some water treatment plants and even technological process modifications.

   In the third variant of the Programme the investments are (over 10 years) 4,575 billions lei. These works will enable 8,000 l/s of first quality water for the consumers, which, if achieved as a source from somewhere else would have a need for 5,935 billions lei, 700 km of connection pipes and 2,009 billions lei more. At the treatment plants level the economies (consumables, various materials) would reach 6.9 billions lei in 10 years.

   As conclusion, the third variant with an investment of 4,575 billions lei, replaces one of 7,591 billions lei, needed in the case of other equivalent water resources.

d. In Romania, just 19.3 % of rural population have centralized water supply access, much below the European average.

   Considering that, the Programme foresees (together with necessary rehabilitation of existing networks), an increase of connection degree of 30 % in year 2000 and 40 % in 2005, but still below the European average.

e. Numerous works for each basis and hydrographic space were proposed, in order to cover or reduce the water deficits in urban areas. Due to the large number of towns with water deficit, it was felt necessary to rank the work on the basis of objective criteria. Following the analysis it was concluded that acceptable ranking criteria would be the water deficit counted as litter/man/year. The works were ranked in the reverse order following this deficit (225; 192; 191).

   According to the third alternative of 108,144 billions lei, the works are:

   - water supplies system rehabilitation - 65.02 %;
   - rural water supply - 5.04 %;
   - water supply for urban supply systems - 4.67%;
   - floods prevention - 4.44 %;
   - water quality protection 4.19 %;
   - ecological and health requirements 0.35 %
   - irrigation water sources 6.62 %;
   - hydroenergetic works 9.6 %;

   Thus various works currently running will be finalized, and accordingly assure imperious needs of water in lacking areas. It will also limit the degradation of those works currently in conservation due to the lack of funds, as well the promotion of new works on the basis of in depth technical and economical analysis, depending on their emergency degree, for areas with problems.

   Out of the total investment, the state budget will cover 35,632 billions lei, the local budgets 56,617 billions lei and other economic agents 15,903 billions lei.

   For the period 1995-1998 the public investment programme in the field of water quality and quantity management the state budget covered 2,332 billions lei.

The general recommendation of European Community, regarding the drafting and implementation of integrated policies and strategies for the water administration are:

- establishment of all necessary conditions for the improvement and functioning of aquatic ecosystems, including the protection of acquartic components and restoration of damaged;
- Assuring the durable use of water resource and of other elements of the ecosystems in such a way that is according to the requirements of aquatic ecosystems and various human necessities, both individual and collective without endangering the future generation in the fulfillment of their own requirements.
- encouragement of the adoption of protection measures based on the precaution principle, in the way of the application of measures to prevent and remove the causes, which led to the pollution and aquatic ecosystems imbalances;
- Encouragement for the administration, forecasting, direction and use of water within an hydrographic basis, in co-operation and correlation with the required environmental protection, and using the «polluter pays» principle;
- Development of co-operation between countries along the same river, on problems related to cross border waters and international lakes.

We consider that the objectives, means and regulations mentioned by the strategy for the qualitative and quantitative water administration, as well as the development programmes as part of it, assure in the same time the general integration conditions, from this activity's point of view, of Romania into European Community at the time horizons of year 2005.

The sector evolution in the period 1999-2000

It is considered that at the level of 1999 the legal harmonization in the field of water administration will be finalized, and the co-operation with the states member to the Danube Protection Convention will be enhanced, due to the entry into force of the Convention.

At the same time the investment effort will ensure:

- The improvement of water quality through the increase of the share of first degree river from 54.3 % in 1993 to 60 % in 2000, through the development and modernisation of waste treatment plants – both industrial and domestic – as well as through the upgrading modernisation of some production processes;
- The percent of urban population connected to the water network will increase from 87% to 89 %;
- The same percent for the rural population will increase from 19,3 % now to 29,9 % in 2000;
- The assurance of water resources for the restructuring and development of economic fields according to the mentions of sectoral strategies;
- Provision of water supplies for the irrigation of surfaces concerned and which will increase the available agricultural area with a supplement of 300,000 ha;
- The reduction of losses in the centralized networks systems of water supply from 40-45 % now to 36 % in 2000;
- The continuation of fight against floods through the building of temporary accumulation lakes, dams and water regulation, in parallel with the rehabilitation of some older works in order to raise them to the modern standards;
- Step by step starting of hydroplants being executed or under construction as well as the starting of new works on the high potential rivers.

The achievement of strategy objectives and development programmes will enable not only to maintain but also the development of a healthy water use system, a better synchronization of public works, agriculture and industry policies, with the water policy, what will lead to an increase of the civilization and health degree for the Romanian population.

Water administration regulations

1. The environmental protection law 137/1995 and Water Law 107/1996, are the basic laws for the activities developed in the field of water management administration
2. Taking into consideration that the Law for Water derives from a package of papers, which will be approved by Minister Decision, the following action, were taken:

3.1. Finalized through minister order and Official Bulletin 100 bis/1997

a. the methodology of drafting and approving the restrictions plans (Order 276/1997);
b. the methodology for the issuing of location permits (Order 279/1997);
c. the procedure and the competencies for the issuing of authorization and permits for water management (Order 148/1997);
d. notification procedure (order 280/1997);
e. the procedure for the establishment of special surveillance regime (Order 275/1997);
f. the norms for the content of technical documentation forwarded to endorsement or to authorization (Order 277/1997);
g. the procedure regarding the participation of water users and public in consulting activities;
h. the procedure for public access to water administration information (Order 281/1997);
i. framework methodology for the elaboration of plans for pretending and fighting accidental pollution (Order 287/1997)

3.2. Finalized, through minister order and Official Bulletin 111 bis/1997

a. the framework regulation for the elaboration of dams exploitation rules, accumulation lakes and water supply adduction with or without dams and the establishment of competencies for the elaboration and approval of basins exploitation rules and monthly exploitation rules for the accumulation lakes (Order 396/1997)
b. the methodology for organizing, preserve and manage the water cadaster in Romania (Order 399/1997)

3.3. Finalized, through minister order and currently to be published in the Official Bulletin, the Procedure for issuing approvals for hydrotechnic works crossing, as well as the Technical guide for designing and achievement of such works (Order 615/1997)

3.4. Finalized through government decisions

a. update of the penalties mentioned in Water Law (GD 83/1997, published in Official Bulletin 48/1997);
b. special norms regarding the character and size of sanitary protection areas (GD 101/1997, published in OB 62/1997);
c. norms regarding the limit for pollution charge for waste waters evacuated in the water resources (GD 730/1997, published in OB 327/1997);
d. organizational and functioning norms for the Central Commission for Protection against Floods, Hazardous Meteorological Phenomena and Hydrotechnical Works Accidents (GD 210/1997, publish in OB 103/1997)

3.5. The norms regarding the limits for pollution charges evacuated into the sewage system, were promoted by common order of ministries of Environment (645/1997), Public Works (5029/1997) and Health (190/1997) and published in the OB 303bis/1997. This order, correlated with a GD for the approval of the Norms, reflects the adoption of some EU Directives.

3.6. The GD 568/1997 regarding the organization and functioning of Ministry of Environment (OB 266/1997) approved the regulation for the functioning of the following commissions

a. National Commission for the safety of dams and hydrotechnical works;
b. National Committee for the Romanian International Hydrological Programme

4. National Sources, Instruments and Mechanisms for Funding of Water Quality and Water Management Programmes and Projects

4.1. Relevant Public Funding Sources and Instruments in Use

National Environmental Fund - DRAFT

Environmental Fund Law

Chapter I

General dispositions

Art. 1 The National Environmental Fund is established as an economical and financial instrument in order to facilitate the process of environmental protection and quality through encouraging investments for technologies and activities, which replace polluting substances from the fabrication process, reduce the negative impact or the risk of negative impact on the environment and achieve special protection measures, to preserve the biodiversity and reconstruct the ecology, as well as to develop the scientific, educational and informational framework within environmental protection.

Art. 2 The National Environmental Fund represents a special extrabudgetary fund provided to complete budgetary allocations, in order to achieve strategic objectives from the National Environmental Strategy.

Chapter II

Section 1 (Version I)

The National Environmental Fund Management

Art. 3

a) The Central Authority for Environmental Protection is empowered to co-ordinate, manages and controls The National Environmental Fund, through the following internal structures:

1. The management unit of The National Environmental Fund;
2. The Directorate for strategy, policies and environmental legislation;
3. Financial control directorate

b) In case of reorganizing the Central Authority for Environmental Protection, the new structure will take into consideration the reallocation of rights and obligations allocated to the above mentioned structures.

Art. 4

An Endorsement Committee is established to approve the allocation of funds, based on the analysis and recommendations from the management unit regarding the distribution and character of the allocated amount. The Endorsement Committee is composed by:

1. The Minister or a Secretary of State representing the -Central Authority for Environmental Protection - President
2. A Secretary of State from Ministry of Finance - Vice-president

3. A Secretary of State from Ministry of Industry and Trade - member
4. A Secretary of State from the Ministry of Public Works - member
5. A Secretary of State from the Ministry of Health - Member
6. A Secretary of State from the ministry of Agriculture - Member
7. The President or a Vice-president form the Competition Council - member
8. A person representing the Commission for Public Administration and Ecological Balance form the Chamber of Deputies of the Romanian Parliament - member
9. A person representing the Commission for Health, Ecology and Sport of the Romanian Senate - member
10. A person representing the Romanian Academy - member
11. A person representing the Romanian environmental Egos elected by the environmental representatives - member

Art. 5

The Directorate for Strategy, Policies and Environmental Legislation prepares the objectives and the eligible priorities for the use of The National Environmental Fund and establishes the methodologies to be used by the management unit to evaluate the project proposals as well as other regulations regarding The National Environmental Fund

Art. 6

The Financial Control Directorate controls the way the management unit and the established financial institution run the financial operations.

Art. 7

The National Environmental Fund Management Unit, which has the function of permanent secretariat, is subordinated to the Central Authority for Environmental Protection and has the following attributions and obligations:

a. Evaluates the project proposed for financing;
b. Proposes to the Endorsement Committee financing project, which fulfils the selection criteria established by the Central Authority for Environmental Protection;
c. Assures the necessary publicity for the use of the fund, the requests for financing and the proposed projects;
d. Finalizes other tasks requested by the operations of the fund and which do not contradict the unit responsibilities, as they were nominated by the present law;
e. Other tasks requested by the Endorsement Committee;
f. Organizes national and international tenders to allocate available funds for studies or projects;
g. Monitors the correct allocation and use by all beneficiaries;
h. Reports periodically regarding the fund situation, its way of being used, and the financial activity status;
i. Proposes to the Directorate for strategy, policies and environmental legislation measures for the correction of any disfunctionality produced in the use of the fund and of the financing activities.

Art. 8

The management unit can employ, if necessary, external experts for the evaluation of some project proposals.

Art. 9

The project list to be financed by The National Environmental Fund and the reports regarding the results of The National Environmental Fund are published at least once a year. The proposals for financing will be announced and debated public before endorsement.

Art. 10

The financial operations will be managed through a financial institution selected by the Endorsement Committee based on a tender with minimum three offers. The tender procedure is established by order of the Minister of Central Authority for Environmental Protection, with the endorsement of Ministry of Finance and Ministry of Privatization. The financial operations refer both to deposits and payments from this fund and from beneficiaries, as well as the fund management to ensure the protection of its real value against inflation.

Art. 11

The cost of banking operations, together with the other occasional expenses for the fund management, experts use and Endorsement Committee functioning will get maximum 7 % out of the annual budget of The National Environmental Fund.

Art. 12

The organization and functioning rules for the Endorsement Committee and for the management unit are approved by Government Decision at the initiative of the Central Authority for Environmental Protection.

Section 1 (Version II)

Management of the National Environmental Fund

Art. 3

The Management Unit of the National Environmental Fund is established as extrabudgetary public institution and is consisted from:

1. Endorsement Committee and
2. Permanent Secretariat, with technical competencies, for the co-ordination and financial control, subordinated to the Central Authority for Environmental Protection

Art. 4

The Endorsement Committee will endorse the fund allocation, based on the recommendation from the management unit regarding the repartition and character of the allocated amount. The Endorsement Committee is composed of:

1. The Minister or a Secretary of State representing the -Central Authority for Environmental Protection - President
2. A Secretary of State from Ministry of Finance - Vice-president
3. A Secretary of State from Ministry of Industry and Trade - member
4. A Secretary of State from the Ministry of Public Works - member
5. A Secretary of State from the Ministry of Health - Member
6. A Secretary of State from the ministry of Agriculture - Member
7. The President or a Vice-president form the Competition Council - member
8. A person representing the Commission for Public Administration and Ecological Balance form the Chamber of Deputies of the Romanian Parliament - member

9. A person representing the Commission for Health, Ecology and Sport of the Romanian Senate - member
10. A person representing the Romanian Academy - member
11. A person representing the Romanian environmental NGOs elected by the e environmental NGOs representatives - member

Art. 5

The Directorate for Strategy, Policies and Environmental Legislation prepares the eligible objectives and priorities for the use of The National Environmental Fund and establishes the methodologies to be used by the permanent secretariat of the management unit for the evaluation of proposed projects as well as other regulations referring to The National Environmental Fund;

Art. 6

The Financial Control Directorate controls the way in which the management unit and the established financial institution is running the financial operations.

Art. 7

The Permanent Secretariat of the National Environmental Fund is subordinated to the Central Authority for Environmental Protection and has the followings attributions and obligations:

1. Evaluates the proposed projects;
2. Propose to the Endorsement Committee financing proposals, which meet the selection criteria established by the Central Authority for Environmental Protection;
3. Assures the necessary transparency for the use of the fund, the requests and the approved projects;
4. Finalizes any other tasks requested in order to make the fund operational and which do not contradict the unit responsibilities, as stated by the present law;
5. Any other tasks given by the Endorsement Committee;
6. Organizes national and international tenders to allocate available funds for studies or projects;
7. Monitors the correct use of funds by all the beneficiaries;
8. Reports periodically regarding the fund status, disbursement rate and status of achievement of financial activities;
9. Proposes to the Directorate for strategy, policies and environmental legislation measures to correct any disfunctionality in the use of the fund and of the financing activities.

Art. 8

The Management Unit can hire if necessary external expert for the proper evaluation of certain project proposals.

Art. 9

The project list to be financed by The National Environmental Fund and the reports regarding the results of The National Environmental Fund are published at least once a year. The proposals for financing will be announced and debated public before endorsement.

Art. 10

The financial operations will be managed through a financial institution selected by the Endorsement Committee based on a tender with minimum three offers. The tender procedure is established by order of the Minister of Central Authority for Environmental Protection, with the endorsement of Ministry of Finance and Ministry of Privatization. The financial operations refer

both to deposits and payments from this fund and from beneficiaries, as well as the fund management to ensure the protection of its real value against inflation.

Art. 11

The cost of banking operations, together with the other occasional expenses for the fund management, experts use and Endorsement Committee functioning will get maximum 7 % out of the annual budget of The National Environmental Fund.

Art. 12

The organization and functioning rules for the Endorsement Committee and for the management unit are approved by government Decision at the initiative of the Central Authority for Environmental Protection.

Section 2

Sources of establishment

Art. 13

The sources for the establishment of The National Environmental Fund are:

a. Amount from taxes and tariffs for activities using environmental resources:
   - Directly, or either by using natural resources or natural capacity to assimilate emissions and wastes;
   - Amounts resulted from environmental penalties;
b. Issuing interest bearing and tax-free bonds;
c. Other sources
   - State budget, payments, donations, financial assistance granted by legal and physical persons, NGOs and GOs, financial national and international institutions a/o;
   - Revenues from various actions organized for the benefit of The National Environmental Fund;
   - Other revenues approved by the Central Authority for Environmental Protection.

Art. 14

The calculation methodologies and the proportion of amounts specified as sources at art. 13, par. a) are established by Government Decision at the initiative of the Central Authority for Environmental Protection and do not include the amounts:

a. With other destination, in force at the moment of promulgation of present law;
b. To cover costs or services rendered.

Section 3

Destination for the National Environmental Fund

Art. 15

The National Environmental Fund is used for;

a. Public investment for environmental protection:
   - Ecological reconstruction project promotion;
   - Support measures for protection and durable exploitation of natural patrimony;
   - Support for the management of protected areas and natural monuments;

b. Credits for environmental protection investments, established through conformity programmes, for the agents with economic and social activities having environmental impact;
c. Subsidies for interest rate of credits for environmental protection activities;
d. Subsidies for promoting activities for waste treatment and recycling;
e. Guarantee for credits contracted for environmental protection;
f. Contribution to revenue compensations for the private owners exploiting their proprieties as protected areas, compared to normal exploitation;
g. Support for clean technology transfer, environment protection and rehabilitation;
h. Ecological awareness campaigns, education and training;
i. Support the operational research activities requested to sustain decisions of the Central Authority for Environmental Protection;
j. Financing priced contest for activities related to environmental protection;
k. Achievement of objectives defined by the National environmental Protection Strategy or by the National Action Plan for Environmental Protection.

Art. 16

a. The financing form The National Environmental Fund is not permitted for direct beneficiaries, which did not pay taxes, tariffs, penalties or fines previously decided by the environmental protection authorities.
b. Projects foreseen at art. 15, par. b), c) d) and e) are not eligible, if the direct beneficiaries are not supporting at least 30 % of the project value.
c. No project is eligible until it makes the proof that other financing sources- previously approached- is not available.

Chapter III

Sanctions

Art. 17

a. The non-compliance with the legal regulation for the establishment and use of the environmental Fund leads to legal responsibly, penal or contravention by the case, in the condition of the legislation regarding the fiscal evasion.
b. Not paying to The National Environmental Fund the due obligations, incurs the canceling of the right to obtain any form of sustaining foresee at Art. 14 of the present law.

Chapter IV

Final disposition

Art. 18

The disclosure and application of sanction mentioned in art 17, par. a) are implemented by the territorial authorities of the Ministry of Finance.

Art. 19

a. The Government Decision for the management of The National Environmental Fund will be proposed by the Central Authority for Environmental Protection, with the consultation of the relevant ministries, no later that 90 days from the date of publishing the present law in Romania's Official Bulletin.

b. The methodology for the calculation and the amounts specified as sources for The National Environmental Fund, will be established, completed and updated periodically by Romania's Government Decisions.

In Chapter V of the Law of Waters the economic instruments are presented. Art. 80 says that water preservation, recycling and water quality protection are encouraged while those who are responsible for water pollution are to pay taxes or penalties. The incentives of those who act the water pollution's abatement consist of bonuses, that is reduction of taxes applied for water abstraction and discharges.

The taxes, penalties and bonuses, are applied by RAAR, according to the procedures elaborated by MWFEP. According to ART.84 from the Law of Waters the so-called «WATER FUND» is to be used, inter alia, for water pollution abatement actions.

The Water Fund is not related to the State Budget, which is another financial source for investment in water works.

«Polluter pays» principle is applied by obliging the natural or legal persons to pay a tax corresponding to the pollutant quantity discharged in waters (between 5,000 and 22,000 ROL/tone of polluting substance). For outrunning the contracted pollution levels penalties are paid (see the Annex 9). The issues mentioned above are established by GOVERNMENT Decision No 1001/1990 and Governmental Decision No138/1994.

According to the GD 1001/90 the following taxes are to be paid by natural or legal persons discharging pollutants by their wastewater into surface waters complying with the authorization, as it follows:

- Suspended matter and dissolved substances mentioned in the given authorization(including nutrients, detergents, etc): 5376 ROL/tone of pollutant (0.63$ at the exchange rate of 8478 ROL)
- Oxygen consuming substances: 21,746 ROL/tone of pollutant (2,56$)

For exceeding the authorized conditions penalties are applied.

4.1.1. Standardized Funding Mechanisms for Investments in Water Pollution Control

Maximum profit/cost ratio aimed at establishing the priorities as regards the environment protection actions remains valid indefinitely, but mostly during the transition period towards the market economy, under such circumstances as when the financial resources are limited.

The positive outcome of this action should outgrow the damages that would harm the environment if the said action were not carried out.

Moreover, the profit/cost ratio allows for the hierarchization of such actions so that on the one hand those having a maximum positive effect are applied in the first place while on the other hand measures less expensive but having an immediate effect are applied on an emergency basis.

The actions of public interest are to be carried out with the financial resources coming from the state budget. The actions aimed at diminishing or eliminating the negative impact the economic activities may have on the environment are to be implemented with financial means coming from the said economic agencies, which are also responsible for the termination of the provided volume of works in due course.

Guide to Time Required for Project Preparation

	GRANT (SIMPLE)	GRANT (COMPLEX)	LOAN (SMALL)	LOAN (LARGE)
Identification	1 month	3-6 months	3-6 months	up 2 years
Preparation	1-2 months	3-6 months	6-18 months	up 2 years
Appraisal	1-3 months	3-6 months	3-12 months	up 1 year
TOTAL TIME	3-6 months	9-18 months	1-3 years	1-5 years

The time needed for each stage of project identification, preparation and appraisal varies greatly. The time taken will depend on the size and complexity of a project, the procedures and requirements of the potential funder, and the number of funders involved.

For a small project, which will be funded by a grant from a single funder, the time taken from project identification to the completion of appraisal could be as little as 2 to 3 months. A few funders will only accept project proposals for possible funding at certain periods of the year.

The main project assessment techniques are:

- technical evaluation,
- cost benefit analysis(for financial, economical and social aspects),
- risk assessment,
- stakeholders or socio-cultural analysis,
- institutional analysis,
- environment impact assessment,
- environmental audit,
- multi-criteria analysis.

Cost Benefit Analysis (CBA)

Cost Benefit Analysis is a widely used analysis technique in a project development and assessment. It allows a quantitative assessment to be made of the expected results of a project (expressed as financial, economic or social returns on investment) and to compare the effectiveness of the investment with alternative uses of the resources.

Increasingly cost-benefit analysis also quantifies and includes environmental variables.

The key parameters of CBA are Cash Flow, Payback Period, Net Present Value, Internal Rate of Return and Benefit-Cost ratio.

Financial CBA

The financial CBA assesses the expected income and expenditures from a project. These are expressed in present or future money values and represent the relevant benefits and costs.

For private sector projects, the financial analysis calculates a project's financial or commercial status at market prices. For public sector projects it calculates a project's contribution to, or use of, government funds.

Economic CBA

Economic CBA assesses the impacts of the project on the wider (usually national) economy. A project may give a positive result in a financial CBA but not correspond to the national interests of policy.

Advantages and Limitations of CBA

To be able to interpret the results produced by CBA it is necessary to understand some of the advantages and limitations of this analysis technique.

Advantages:

- financial analysis can provide an indication of a project's profitability;
- calculation of cash flow allows to identify any potential problems in project's financing;
- economic analysis shows whether a project is an efficient allocation of resources and its impact on the national economy;

Limitations:

- the quality and amount of input data determines the reliability and usefulness of the analysis. If major projects effects cannot be adequately specified or quantified, the results of CBA are of limited value and should be used with caution; e.g. environmental costs and benefits are often difficult to quantify;
- the results of CBA can be based towards selecting projects, which generate revenues rather than public infrastructure projects;
- CBA is only one of a series of analyses made in project preparation and appraisal. Other factors, such as institutional, technical, socio-cultural aspects, should be carefully considered before investment decisions are made.

Risk Assessment and Management

The analysis of risks and assumptions for critical elements of a project and external factors is very important.

For example: the paying back of a loan to build a municipal wastewater treatment plant may depend to certain extent on each household paying higher water charges.

This in turn depends on the Government passing the enabling laws to enable the municipality to raise the charges paid by households and a system being set-up to collect the charges.

In this case there are risks that the new laws will be delayed or amended, that the municipal water authority's new billing system will be delayed, or will malfunction and finally that not enough people will pay their bill on time (leading to lower revenues and extra administration costs).

Minimizing the potential effect of these risks would be an important element in project preparation for the wastewater treatment plant. The reaching of the exigency levels applied in European Union countries with reference to the limit concentrations or to the maximum loading of polluters is an operation requiring time in Romania on the account of the very high costs it entrains.

4.1.2. Typical Sources of Investment Money for Municipal Wastewater Treatment Plants

see annex 5

Three main types of project funding available are:

- Grants
- Loans
- Equity

These are often combined to make up an overall funding package for a project.

Funding for projects may came from the budget of the project proposer, from domestic sources such as WATER FUND, from bilateral or multilateral funders, or from International Financing Institutions.

It is unusual to be able to obtain 100% from any source. Most international funders will require a contribution (financial or in-kind) from the project proposer as a condition of their participation.

It is also a good idea to think about co-funding (i.e. two or more funders) for larger projects or in cases where there may be restrictions on what an individual funder can provide (e.g. limits on fund, equipment, and consumables).

4.1.3. Typical Sources of Investment Money for Industrial and Commercial Wastewater Treatment/Pre-treatment

see annex 5

The main types of project funding include:

- Grants
- Loan-soft (sometime called 'concessional') and commercial
- Equity.

The main differences between these types of funding are in the amounts of money and the conditions, under which they can be available. All funds have associated costs (including grants). The cost of the funds will depend on the conditions, under which they are made available.

GRANTS

Grants are generally only available for smaller projects and those, which cannot be reasonably funded on the basis of loan (commercial or soft loan) or equity funding. Grants are usually given to projects regarded as important from a national or international perspective, and which cannot be funded in other way.

Many founders provide technical assistance through grants. This usually involves the transfer of expertise or technology. Technical assistance may involve providing long term adviser, consultants, equipment needed to undertake projects, or training. This can be an especially important aspect of institutional strengthening projects.

Bilateral founders provide grants for pre-feasibility or feasibility studies. This can lower the total costs of obtaining a larger loan from a domestic or international bank for a project, because the studies costs would otherwise have to be covered by the loan. They may also provide grants to fund part of a project, which is also supported by IFI loans. The Project Preparation Committee is a mechanism, which promotes environmental investment in this manner.

Advantages and disadvantages of grants:

Advantages:

- no repayment is required;

Disadvantages:

- are not available for projects, which will generate revenue;
- founder priorities may require project objectives to be changed.

LOANS

Loans are money borrowed for a project that has to be repaid to the founder under specific conditions. This requires that the recipient is:

- creditworthy
- has a potential cash flow sufficient to meet the interest payments and to repay the sum borrowed
- can provide security against default.

A loan will usually cover only a part of the total projects costs (e.g. 20-50%).

Security against default is known as a loan guarantee. This is a legal obligation to compensate a lender if the borrower does not repay the loan in time. In some cases the Government provides such guarantees.

This is known as a sovereign risk guarantee. In other cases the guarantee may be provided by municipal government i.e. municipal risk guarantee. Such guarantee are usually only required for large loans with public sector involvement.

IFIs are rarely interested in projects where they are being asked to make a loan less than 5 MECU. However, it is sometimes possible to link a number of projects together in a package so that their combined value exceeds this threshold. Moreover, multilateral founders are now developing means of lending smaller amounts through banks.

A soft loan is provided on more favorable terms than could be obtained on the market. A loan may be softened in several ways: a bank may accept lower interest rates, or longer repayment periods, or less security on the loan, or may lend more money than otherwise would have been given. Grants from bilateral founders are sometimes used to soften the conditions of a loan. This can be, for example, through providing *grants on interest payments.* This is where a funder offers a grant to lower the commercial rate of interest on offer.

Advantages and disadvantages of loans

Advantages:

- enables the development of revenue generating projects;
- loans are often the only form of funding available to private enterprises;

Disadvantages:

- can be expensive to obtain and to administer;
- local banks may be unwilling (or unable) to accept the risks of a project;
- Need to have sufficient financial resources to repay the loan.

EQUITY

This is where an investor puts money into a company or project (usually by buying shares) without a specific claim for direct repayment. In doing so it takes an equity stake. The expectation is that over time there will be a significant return on the investment – perhaps as much as 20% - but this is a risk. The return on investment from environmental projects is often below that required by an equity investor.

Combining Different Types of Funding

Large projects may be funded through a combination of these types of funding. For example, a combination of grants, soft and commercial loans, and equity within the total funding package may fund a large project.

External funders will usually develop a financing strategy at an early stage of project development. This allows them to respond to the current market conditions i.e. the cost of borrowing money is constantly changing. The financing strategy will involve consideration of alternative financial instruments (i.e. types of funding), ways of sharing risks and obtaining guarantees.

SOURCES OF FUNDING

The choice of funder will depend on several factors, but especially on:

- the size of project – the amount of funding required;
- the nature of the project e.g. whether the project is expected to generate income;
- whether the project is suitable for commercial funding e.g. whether it will generate enough money to pay back a normal bank loan.

Generally:

- small projects costing less than 1 million ECU may be eligible for grants from domestic, bilateral, or multilateral sources;
- large projects costing over 15 million ECU may be eligible for loans from IFI's (their minimum loan size is around 5 MECU);
- Grant, loan or a combination of them from a number of complementary sources may fund projects costing between 1 and 15 million ECU.

Larger projects are always funded by more than one party – national banks, IFI's and *National Funds* tend to provide only a certain percentage (e.g. 20-50%) of the total project costs in order to limit and share the risks (sometimes referred to as «limiting their exposure»).

A list of the main funding sources are summarized as follows:

Own resources

Funds available from the project proposal's own organization

National resources

- Central, regional or municipal government grants and loans;
- Public investment programmes;
- National Funds - generally funded through environment taxes and changes, together with donor contributions;
- Commercial banks.

Bilateral funders

Grants for technical assistance, training and investment support. E.g. from Denmark, U.K.

International Financing Institutions (IFIs)

Low cost funds from international capital markets channeled as loans to recipient countries, which pose a credit risk to commercial lending institutions. Some IFIs also provide equity financing and issue guarantees.

Generally, when a project proposer has decided that part of the funds will have to come from a loan, then it is advised to start with local sources first. A project proposer should probably first approach a municipal fund. If that is unsuccessful, then a national environmental fund could be tried. If that is unsuccessful, then a commercial bank within the country could be approached. Only for a small percentage of projects (probably large or complex ones) you would consider an IFI.

Domestic Sources

The first source of funding would normally be your own budget. If you cannot fund the project completely or at all from your own resources, then external funders should be considered. Most external funders will, however expect you to contribute to a project either directly with money from your organization or company, or indirectly by providing manpower and facilities.

Funding a project from domestic sources – a loan or a grant – is the usually the best. Other projects can be supported through national or municipal Environmental Funds. Commercial banks operating in the country may also provide loans. However, the possibilities are constrained by the under-developed and under-capitalized banking systems in many CEECs.

International funders may contribute to domestic funding, for example through:

- Environmental funds – these may provide a means for IFIs and bilateral funders to provide grants or soft loans. They may also provide a channel for commercial lending, usually directed at smaller, more targeted projects;
- Private sector, *joint venture* partnerships – especially for industrial projects;
- On-lending arrangements, or credit lines, established through domestic banks.

Funding by Non-Governmental Organizations (NGOs)

Some international NGOs (e.g. Regional Environment Center for Central and Eastern Europe) provide grants for projects. They are often involved in channeling funds from multi-lateral or bilateral funders to small NGO projects.

International NGOs are also able to advise on, and sometimes help, obtain funds for projects from other funders. They also sometimes provide in-kind support.

Some private Foundations (e.g. the Soros Foundation) provide funds for project, which meet their objectives and funding criteria.

Bilateral Funders

Many individual countries, including the most Western European countries, USA, Japan and Canada provide assistance to (individual) CEEC. They all differ in their areas of interest and methods of doing business. They are often called ‘bilateral donors’.

Bilateral funders are often concerned to ensure that their own best interests are served, and will often insist on *‘tied assistance’* i.e. that the country receiving the funds procures the required goods and services from the funding country.

Multilateral Funders

These organizations are often called 'international donors'. The most significant multilateral funders in Central and Eastern Europe are:

- European Union's Phare Programme;
- Global Environment Facility;
- UNDP.

Multilateral funders have traditionally focused on providing technical assistance funded by grants. However they are increasingly becoming involved in investment-related activities in collaboration with IFIs.

International Financing Institutions (IFIs)

IFIs provide a main source of long term, low cost project funding in the form of loans. They see their functions as:

- Channeling funds from international capital markets to recipient countries;
- Providing funds on competitive or favorable terms;
- Carefully appraising projects and programmes seeking loans.

Some IFIs will provide loans with interest margins below market rates and extended repayment periods (up to 15-20 years).

The most active IFIs in Central and Eastern Europe are (not in order):

- European Bank for Reconstruction and Development – EBRD;
- European Investment Bank;
- Nordic Investment Bank;
- Nordic Environment Finance Corporation – NEFCO;
- World Bank Group (including IBRD and IFC).

4.1.4. Patterns and Procedures for Municipal and Industrial Wastewater Treatment

see Annexes 5, 6

4.1.5. Agricultural Pollution of Ground Water and Surface Water

The actual measures for reduction of water pollution from agriculture are related to the privatization process. The landowners are not able to invest their money in construction of controlled storage tanks for liquid manure and their technical knowledge is not adequate to use correctly manure according to capability of vegetation and cultivated land.

The privatization process has induced a significant decrease of pesticides consumption due to the poverty and lack of knowledge of the landowners. Due to the reduction of pesticides consumption the concentration values of these substances in the ground water have been decreased significantly.

4.2. Private Financing Models in Use

4.2.1. BOT (build-operate-transfer)

No information about BOT in Romania at this time.

4.2.2. Private Management of Services

No information about Private management of services in Romania at this time.

4.2.3. Leasing Models

Several measures have been adopted concerning the customs treatment of machines, equipment and installations imported as part of leasing transactions. (Governmental Ordinance No.12/1995).

According to these provisions, the machines, equipment and installations to be used in production that are imported by Romanian legal persons in terms of the leasing contracts they have concluded with foreign partners shall be admitted in a temporary import system, without the payment or guarantee of customs duties, in the following conditions:

The machines, equipment and installations shall not be older than 2 years since their manufacturing date;

The time limit for returning the goods under consideration or giving them a different customs destination is laid down in the leasing contract, but it cannot be longer than 36 months.

Leasing of Real Estate and Concessions

Individuals and legal persons, whether Romanian or foreign, can rent property in Romania.

The lessor must pay the taxes levied on income from the property. Leasehold provisions can be freely negotiated between tenant and landlord, on condition that minimum values set by fiscal authorities are observed. Lease terms for property under state ownership are set by public auction.

Concessions, being the long-term leasing of a potentially productive asset (a production unit land), are possible by a competitive bid.

4.3. Actual Water and Wastewater Tariffs

4.3.1. Actual Tariff Policies and Systems

In 1990, it was approved the Government Decision no. 1001/1990, regarding the set up of a unitary system of payments for the products and services of waters' administration, in order « to improve the role of the economic instruments in the rational administration and the protection of the waters' quality and the setting on economic principles of the prices and tariffs system in the waters' administration.

«In view of users' stimulation to reduce the water demand and the improvement of the waters' quality, in the field of waters' administration, in accordance to the dispositions of the present decision, the prices and the tariffs for the products and services of waters administration, and, also, penalties for infringing the legal dispositions concerning the waters' quantitative and qualitative use.»

The prices and the tariffs were sized in order to totally cover the exploitation, maintenance and repairs expenses of the National System of waters' Administration and a part of hydro-technical works' amortization from administration, defense works against the floods being exempt of amortization in conformity to the law.

The implementation of the new prices system was difficult, because the users hardly accepted the idea that the water is a good with value.

In the prior system, only those who took water directly from the accumulation lakes paid the water, at differentiated prices on every lake in part.

The impact appeared on three components:

- the prices for the taken water;
- the tariffs for evacuation of impure substances in the watercourses;
- The penalties for non-respecting the regulation acts or commercial contracts' dispositions.

Aims

The aims, for which the prices system was introduced, were largely reached, and namely:

- organic integration of the waters' administration activity in the national, social and economic circuits;
- expenses recover of the exploitation and maintenance in the respective field, without financing the infrastructure, through the distribution of the financial efforts to beneficiaries;
- change of the beneficiaries' behavior in relation with the waters ➜ saving and protection;
- Supply of some conditions of economic nature and environment's protection in order to develop the totality of activities in relation with the waters.

After the introduction of the payments unitary system, the users reduced the water demand.

As in the same time there were some transformations in the economy, it is impossible to establish how much from the taken water's reduction is due to the payments' introduction effects and, also, to the diminution of the users' production.

Effect

The effect on the beneficiaries is felt through the following aspects:

Positive aspects

- more correct dimensioning of the water demand, although generally speaking, the demand is bigger than the effective taking;
- Reduction of the losses in the water internal circuits in the process of production and water's internal new circulation.
- increase of the interest for the volumemetre install, so that not to pay bigger volumes than those effectively taken;
- Improvement of the water quality in very polluted zones.

The effect of the making's reduction:

- Costs reduction of the wastewater taking and treatment ➜the diminution of the product's price;
- Reduction of the evacuation and, consequently, of the impact on the drainage channel. But if the purifying stations are not equipped with new technologies, the effect is low.
- Reduction of the transported water volumes ➜ lower costs in the process of networks' rehabilitation ➜ reduction of the product's price;
- Through the internal new circulation of the water. The total costs with the water reduce:
- reduction of the product's price or
- Production increases at the same costs with the water.

Negative effects

- as their aim was to realize bigger production and competitive products, they firstly made investments in the technology of product fabrication, and after they obtained a bigger profit, they would improve, also, the purifying stations of the wastewater or in the internal system of water's administration;
- The costs with the water of the companies, although represent a low percentage from the total of the costs, 1÷2%, it is very hard to be paid to the units of waters' administration.
- The payment to the suppliers is made with priority for energy, gas, raw materials, so on, and finally the water.

4.3.2. Level and Structure of Cost

see Annex 7

Note: From 1991, in Romania it is used a payment system for the products and water administration' services, which has complementary stipulations beside the goods and services definition, so system application could not be done but strictly on the limit of acts of the rules application, being completed with penalties for exception from rules.

And tariffs for evacuation, in the approved limits, as well the principle: the consumer pays and also the one who pollutes.

In Chapter V of the Law of Waters the economic instruments are presented. Art. 80 says that water preservation, recycling and water quality protection are encouraged while those who are responsible for water pollution are to pay taxes or penalties. The incentives of those who act the water pollution's abatement consist of bonuses, that is reduction of taxes applied for water abstraction and discharges.

The taxes, penalties and bonuses, are applied by RAAR, according to the procedures elaborated by MWFEP. According to ART.84 from the Law of Waters the so-called «WATER FUND» is to be used, inter alia, for water pollution abatement actions.

The Water Fund s not related to the State Budget, which is another financial source for investment in water works.

«Polluter pays» principle is applied by obliging the natural or legal persons to pay a tax corresponding to the pollutant quantity discharged in waters (between 5,000 and 22,000 ROL/tone of polluting substance). For outrunning the contracted pollution levels penalties are paid (see the annex 9). The issues mentioned above are established by GOVERNMENT Decision No 1001/1990 and Governmental Decision No138/1994.

According to the GD 1001/90 the following taxes are to be paid by natural or legal persons discharging pollutants by their wastewater into surface waters complying with the authorization, as it follows:

- Suspended matter and dissolved substances mentioned in the given authorization (including nutrients, detergents, etc): 5376 ROL/tone of pollutant (0.63$ at the exchange rate of 8478 ROL)
- Oxygen consuming substances: 21,746 ROL/tone of pollutant (2.56$)

For exceeding the authorized conditions penalties are applied.

In order to size up these prices and tariffs we have to check their correctness and to improve the present system, because the costs necessary to be covered are much bigger then the effective cashing.

For example, the tariffs for evacuation cover only the costs for water quality monitoring, and for the administration ones; the prices used for the raw water reflect neither the marginal cost of the producer (water administration authority), nor the marginal cost of the consumer (opportunity cost), nor the characteristic feature of water: its rarefies.

We have to point out that this price system made possible to consider the water as a public good with economic value, a very rare situation even in the very developed country; it was based on the fact that the water resources are a complex system on national level, which includes the surface and underground waters as the quantity and quality. The base unity is the watershed.

The price for water paid by the population is the same with the price paid by the companies, namely 1585 ROL/m3 (0.18 $ at the exchange rate 1 $=8478)

The tariffs presented in Annex 7 are for the water administration products and services.

4.3.3. Level of Actual Cost Coverage

see Annex 8

Explanatory note: the revenues from month to month cannot be increased having in view the different exchange rate because the prices are not automatically increased or decreased by the depreciation of the ROL.

According to the Law of Waters, all natural waters belong to the public and they are under the administration of RAAR. According to the same Low mentioned above, the MWFEP is responsible for co-ordinations of the National Strategy of Water Management as well as the implementation of the strategy and its compliance with the legal acts.

There are 12 branches-institutions organized by tributary areas of each main inland river; each of these institutions is subordinated to RAAR.

In the Annex 8 is presented:

- Medium cost of the raw water for the whole country in ROL and USA $
- Evolution in 1997 of the revenues and expenses for RAAR
- Evolution of the contracted and supplied water volume during 1995-1997 and prognosis for 1998 of RAAR.

4.4. Actual System and Practice of Pollution Charges/Penalties

4.4.1. Charges/Fees for Water Abstraction (municipal, industrial, irrigation)

see Annex 7

4.4.2. Charges/Fees for Wastewater Discharge (exceeding defined quality standards)

see Annex 7

4.4.3. Other Relevant Penalties

see Annex 9

4.4.4. Assessment of Efficiency of Actual Practice

Problems with Beneficiaries Due to the Increase of Prices or to the Introduction of New Payments

- Due to the delay of the goods and water administration' services payment, which have influence on the volume of the maintenance works and repairs, and due to the time inflation, the value of the usage of collections decreases at the same time with the increase of the river bed and constructions degradation process.
- If we use credits, due to the high interests, we get supplementary costs, which determine the increase of the water real price.
- The decrease of the water volume as a result of the decrease of the production capacities or of the closing of some industry departments determines the water price increase because the expenses on branch are relatively constant.
- The users who are on payment incapacity are sued and pay the financial penalties, which determines the costs increase of the realized goods or the profit decrease, but the recovery of debts is very difficult.
- In case of establishing the prices on basin, if inside a watershed with many uses one or two important beneficiaries are shut down or are reducing very much their production, their revenues decrease, and the possibility of maintaining the basin system to nominal parameters of function disappears.
- The communal administrations are one of the clients who make problems to us by delayed payments. They are the water suppliers for an important part of small and medium enterprises, which work for export.

The water price has to be brought to its real value. This will be negative for beneficiaries, especially now when the economic situation is difficult.

It is estimated that the maintaining of the unique price divided by sources and beneficiaries will produce a smaller impact than divided prices.

The agriculture was much more advantaged by the establishing of a small price (the value of the water usage is smaller then industry one), that was not indexed as the industry one was.

This aspect is difficult, because the impact of the establishment of a correct price for irrigation water will be much more than the industry one.

At present, it is using a very small quantity of water for the agriculture, although the yearly water price per ha is equal with an egg one.

The updating of the prices depending on the inflation and the decrease of the water volume used by the consumers led in time to collections, which are not covering the entire necessary of expenses in the system.

The penalties collected to Water Fund have not been updated since 1993, therefore their value does not function as a stopping the pollution tool. Even the penalized consumers do not pay the penalties value, departing from the law.

If equalizing the price level with the necessary one, so it covers both the exploitation (operation) and capital increasing, the user possibility or wish to pay will be smaller.

In this case, the invoiced values will rise, but in the same time the debts will rise, too.

If the prices will be differentiated on watersheds, in some of watershed the price at users could rise for 7 time compared with the present one. On these circumstances, for the same product, the water costs will be much higher in some watersheds and much lower in others, compared with the present situation with unique price that will lead to the introduction of big influences on the price of the respective product.

We cannot appreciate the payment possibilities or the acceptance by the beneficiaries of increasing of the prices.

4.5. Quality and Capacity of the National Banking System for Funding of Larger Infrastructure Projects (especially water sector projects)

Brief outline of the banking sector

The restructuring of the Romanian banking system, as part of the overall economic reform, has bolstered the transition to a market economy.

Following Company Law (Law No. 31/1990), the structure and functioning of the banking system was regulated by two major specific laws: Law No. 33/1991 on Banking Activity and Law No. 34/1991 on the Statute of the National Bank of Romania.

The two laws drafted in line with banking regulations issued by the European Union focus on creating a modern and efficient banking system.

According to the previsions of the new legal framework, a two-tier banking system was formally established, where commercial banks (organized as joint stock companies) can perform the whole range of banking services (universal banks) under the authorization and supervision of the National Bank.

The National Bank of Romania can autonomously and exclusively exercise its role and functions as central bank, placed under the authority of the Parliament.

The organization of the Romanian banking system is quite similar to that extant in many developed countries (Belgium, Germany, and the United States), where the central bank enjoys almost full autonomy from the executive.

Over the last six years, the Romanian banking system has undergone quite extensive development, both in conception and volume of activities, as well as in the diversity of the services offered.

The National Bank of Romania

Romania's central bank initiated the restructuring process in 1991, considerable effort being devoted to developing an institutional infrastructure appropriate to a modern and efficient central bank. At present, the main functions and objectives of the National Bank are the following:

- to regulate and control the money supply, credit and interest rates to the benefit of the national economy,
- to control and protect the value of the national currency,
- To make use of specific means in order to mitigate fluctuations in output, trade, prices and unemployment and to stimulate the overall economic growth and promote the welfare of the Romanian people.

The National Bank of Romania performs the following exclusive functions and prerogatives:

- it is the sole issuer of bank notes and coins, as well as of regulations in the monetary, credit, foreign exchange and payment areas,
- establishes and manages monetary and credit policy as part of the global economic and financial policy of the government,
- authorizes and monitors the activity of all Romanian banking institutions,
- refinances banking institutions and provides liquidates to the banking system,
- establishes and manages the foreign exchange policy, is responsible for the enforcement of laws on foreign exchange transactions performed by legal persons,

An influence the exchange rates, holds and manages the international reserves elaborates the balance of payment.

The National Bank of Romania is headed by a Board of Directors appointed for an 8-year period by Parliament, on the recommendation of the Prime Minister. The membership of the Board of Directors includes: the Governor of the National Bank of Romania as President, three Vice-Governors and five members from outside the bank.

The Board of Directors decides on measures to be applied in the field of monetary, foreign exchange, credit and payment policy. It also sets the main guidelines for conducting the operations and the responsibilities of the banks staff.

According to the provisions of the Law on Banking Activity, the National Bank has the right and obligation to adopt prudential regulations relating to: capital adequacy, banking supervision, licensing the establishment and operation of new banks, limits for loan exposure, financial reporting, management and control of foreign exchange resources.

The National Bank of Romania's ongoing co-operation with the International Monetary Fund and other international financial and banking institutions is intended for developing and improving policies and procedures necessary to carry out the operations and accomplish the functions of a central bank.

Commercial Banks

At present, the network of commercial banks in Romania increased five times compared to 1990 and it includes:29 Romanian commercial banks (Romanian legal persons) and 12 branches of foreign banks.

Domestic Banks (Romanian legal persons)

According to the type and sources of capital, the 29 commercial banks (Romanian legal persons) fall into the following categories:

- 5 state-owned banks, including the Saving Bank (CEC),
- 16 private banks, of which 2 banks with domestic capital, 4 banks with foreign capital and 10 banks with both Romanian and foreign capital,
- 8 banks with mixed capital (state-owned and private) of which : 3 banks with domestic capital, 1 bank with foreign capital and 4 banks with both domestic and foreign capital.

The major commercial banks in Romania are the following:

1. the Romanian Commercial Bank(BCR)
2. the Romanian Bank for Foreign Trade(BANCOREX)
3. the Bank for Agriculture(AGROBANK)
4. the Romanian Bank for Development (BRD)
5. The Romanian Bank for Co-operative Credit(BANCOOP)
6. the Bank «ION TIRIAC»
7. the Export-Import Bank of Romania(EXIMBANK)
8. the Bank BANC POST
9. the Savings BANK(CEC)
10. the International Bank of Religions

Commercial banks are legal operating joint stock companies.

In order to be licensed for operating on Romania's territory, commercial banks (either domestic or foreign) have to meet at least the following conditions:

- to provide a minimum nominal capital of lei 25 billion, at least half of the capital shall be paid up at the establishment of the bank, while the reminder can be spread out over a two-year period,
- to draft its memorandum of association and articles of incorporation,
- to present a comprehensive business plan (a feasibility study),
- to guarantee the financial possibilities and trustworthiness of the founders and shareholders, as well as the professionalism of the management,
- to perform the distribution of shares and voting rights,

The managerial team should include at least two qualified and experienced persons, who should be employed uniquely in that position and should reside in the town or city where the bank is located.

When a bank capital is partly contributed by a foreign partner, at least one of the persons appointed, as director should be a Romanian citizen, whatever the proportion of the foreign participation.

In practice, banking companies are legal persons whose main activity object is to provide credits and attract funding from legal or natural persons in the form of demand or time deposits or securities.

Commercial banks are required to open current accounts with the National Bank of Romania and to maintain mandatory minimum reserves in compliance with the regulations laid down by the National Bank of Romania. At present, the reserve requirement ratio for both lei and foreign exchange deposits is 10 percent of the calculation base.

These reserves bear a payable interest rate of 12 percent, but banks shall pay a penalty interest rate of 100 percent for reserves deficit. The reserve requirement ratio for foreign exchange deposits (for each mandatory reserve is set up in foreign exchange) is 20 percent of the calculation base. An interest rate of 3 percent per annum is payable for these reserves whereas the penalty interest rate is 20 percent per annum.

According to the scope of their license and they dispose of, banks can also perform foreign exchange operations and operation with precious metals; they can place, subscribe, manage, hold and trade securities, grant guarantees, etc.

Foreign Banks

Foreign banks may operate in Romania only under the National Banks authorization. The main conditions for being granted a license are similar to those applying to Romanian banks.

In order to get license, foreign banks branches are also required to file the following documents with the National Bank of Romania:

- Articles of incorporation of the parent bank,
- Financial statements for the three previous years
- Description of the banks activity,
- Description of the bank regulation system in the country of origin,
- Written statement of the foreign competent authorities, approving the establishment of a branch on Romania's territory.

The major branches of foreign banks operating in Romania are:

- Societe Generale (France)
- Frankfurt-Bucharest Bank (Germany)
- MISR Romanian Bank (Egypt)
- British Romanian Bank (United Kingdom)
- ING Bank (the NETHERLANDS)
- CITIBANK
- ABN AMRO BANK.

In Bucharest there are also some agencies of foreign banks: an AUSTRIAN, an ITALIAN, a DAUTCH and an AMERICAN.

Assessment of Main Weaknesses and Needs for Improvement

The Government and the National Bank of Romania adopted a package of measures aimed at macroeconomic stabilization, which consist of:

- maintaining a budget deficit that can be financed exclusively by inflationary means and avoiding monetary expansion;
- coordinating fiscal and monetary policy;
- gradual tightening of the monetary policy by making full use of its indirect instruments in order to re-establish the fundamental balances in the economy;

Key monetary measures were taken, such as:

- ceasing the granting of credits at interest rates below the reference of the National Bank;
- increasing the volume and weight of auction refinancing credits, which better reflects the conditions in the credit market;
- discouraging the issuance of money above the level planned by the National Bank; the interest rates for overdraft credits have been raised to prohibitive levels;
- restructuring the reserve requirements mechanisms; mandatory reserves were introduced for residents' foreign exchange deposits (less households) and reserve requirements for residents' lei deposits were reduced;
- Gradual liberalization of the inter-bank foreign exchange rate; at present, de facto internal convertibility of the national currency was accomplished, the official exchange rate and the inter-bank market exchange rate being practically identical (in mid April 1996, the reference exchange rate was lei 8478 for 1 USD).

The tight monetary policy pursued during the last two years has resulted in a series of remarkable achievements, such as:

- increased interest of companies and the public for setting up time deposits in lei; the interest rates applied were perceived as actually positive and active as an incentive;
- lower pressures on the commodity market; relative decrease in demand resulted in decrease in inflation rate;
- significant reduction of the foreign exchange demand, especially in the market sector destined to population; the unification of the exchange rates and desegmentation of the foreign exchange market have had considerable beneficial economic and psychological effects;
- lower dependence of commercial banks on monetary issue, as they succeeded in finding additional credit sources, which lower inflationary pressures;
- the public's confidence in the stability of monetary and foreign exchange regulations increased, as reflected by the steady growth in foreign exchange deposits made by natural persons;
- substantial reduction of inflationary pressures, the most important indication of re-balancing fundamental elements in the economy; the current relative stability of prices indicates the existence of all the necessary prerequisites for economic development and the stimulation of investment;
- International financial institutions and the business world (foreign investors) are more confident and interested in the Romanian economy.

The tables below contain relevant figures for monetary developments, monetary and foreign exchange policies and their results.

Percent change compared with previous December

	December 1993	December 1994	December 1995	December 1996	December 1997
Broad money (M2)	79.60	141.00	138.10	71.60	27.10
Credit to non-government	39.1	156.3	93.5	73.3	30.9
Exchange rate	132.90	163.50	55.50	44.20	22.90
Refinancing	-	339.20	55.90	48.40	38.40
Inflation rate	199.20	295.50	61.70	27.80	27.00

Interest rates applied in the banking system

Annual rate %

	December 1993	December 1994	December 1995	December 1996	December 1997
National Bank of Romania Refinancing interest rate	30.6	120.5	62.4	47.2	35.5
Commercial banks Lending interest rate	43.60	86.40	60.60	43.70	51.90
Deposit interest rate	32.90	42.50	47.40	36.70	40.90

The tight money policy pursued during the last two years, accompanied by clear improvement of the budgetary policy, allowed the re-establishment of macroeconomic equilibrium, thereby creating favorable conditions for economic stabilization and resuming of sound long-term economic growth.

The main strategic objectives of Romania's monetary policy for the future are the following:

- Gradual reduction and improved control over inflation, by maintaining an adequate level of supply in the economy;
- Development and improvement of indirect monetary policy instruments.

5. International Assistance in Funding of Environmental/Water Sector Programmes and Projects

5.1. Documentation of National Policies and Decision Mechanisms for International Co-funding of Environmental and Especially Water Sector Programmes and Projects

This involves the identification of projects that appear suitable for support and to which there is a commitment by all sides.

Identification may be on initiative of government agency a local or foreign enterprise, an international or commercial institution or an IFI at its own initiative.

Country strategies and sector operations policies set the external funder's policies in their overall context and set out the types of operations that the external funder considers suitable for Romania.

These documents provide the basis for a continuing dialogue between the external funder and the borrower/Romania about the most appropriate development strategy and the required institutional adaptations.

Key massages about project identification:

1. Project ownership and responsibility – this rests with borrower; external funder can only support and assist in project preparation and implementation. Responsibilities must be clear from the outset, especially where the project proposer is different from the borrower or the agency implementing it.
2. Project financing – this may be one of the most critical areas. It is important to develop financing strategies giving consideration to the various options on the financial market. Risk sharing between partners, guarantees and new financial instruments, should be considered at an early stage. The borrower must provide equity or considers a joint venture.
3. The role of consultants. They may help with preparation of documentation.

Key messages about project preparation, which covers the full range of technical, institutional, regulatory, environmental, economic and financial considerations necessary for the project to achieve its objectives are:

1. Good technical preparation of the project; long term sustainability should be ensured by addressing how the project will be operated and maintained.
2. Explore the least cost alternative. The least cost option should generally be followed. Modernization and better use of existing assets should be considered before construction of new assets. This approach is often more economically, financially and environmentally beneficial.
3. Include implementation in preparation. A carefully prepared implementation plan or work programme can minimize the risk of costs over-runs. Budgets should include adequate contingencies to cover unforeseen circumstances.
4. Planning technical assistance. First consider the availability of local skills
5. Address environmental issues as early as possible in the project cycle

Project implementation and monitoring is the responsibility of the borrower.

5.2. Actual Financial Assistance from Bilateral and/or Multilateral Institutions

5.2.1. Competed and Ongoing Projects

see Annex 10

Resume - example

1. Memorandum of Understanding between the European Commission, the European Bank for Reconstruction and Development and the International Bank for Reconstruction and Development on Co-operation for Pre-Accession Preparation of central and East European Countries intends to coordinate their respective financial assistance instruments to provide for harmonized action and facilitate strengthened co-operation.

   As a rule the following principles will apply to cofinancing between the EC and IFIs:

   - the use of financing by the EC and IFIs should not replace other financiers, in particular private, market-based financing provided on reasonable terms and conditions
   - in public sector projects, financial contributions by the EC and IFIs should be complemented by contributions from the beneficiaries counterparts, in all cases combined Community and IFIs financing would not exceed 90% of any single investment's total project cost
   - in private sector projects the contributions and financial exposure of projects sponsors should be sufficiently large so as to ensure their sustained interest in the success of their projects
   - in case of infrastructure projects, the grant/loan mix will be based on the principle of maximizing economic benefits and cost-effectiveness; in principle, grant financing would therefore concentrate mainly on investment projects with high net economic benefits yielding limited revenues. EU grants to be awarded for large-scale infrastructure projects must not exceed the financial contributions of all the IFIs and in any case 25% of the total project cost.

2. Phare support to Municipal Utilities Development Programme (RO9710/02/02/L001)

Contract Supervision for MUDP II (2.4 MECU)

BACKGROUND

The total value of the investment programme will be 120 MECU. EBRD will provide a loan of 65 MECU, whilst Romania (Central Government and local authorities combined) will make capital grand contribution totaling 41 MECU. EU Phare support under 1997 Financing Memorandum is for a total of 35 MECU, divided between capital investment of 27 MECU, a grant administration charge of 0.4 MECU and Technical assistance of 7.6 MECU.

Tendering and execution of the contract to be found from EBRD loan and the Phare grant will be carried out under the EBRD procurement rules and procedures in the case of Phare funded contracts the rules and procedures will be modified in accordance with the MUDP II Implementation agreement between EBRD and the European Commission.

In the water supply and wastewater sector, a very substantial volume of investment is needed to reverse the deterioration of infrastructure, raise service levels and improve compliance with environmental standards.

Components

1. Phare funds will be used for investment in 6 cities (Arad, Bistrita, Cluj, Constanta, Focsani, Targoviste) primarily in wastewater components
2. Support will be provided for technical implementation of overall MUDP II investment programme, and supervision of EBRD and Phare financed contracts
3. Assistance will be delivered designed to meet the specific financial, operational and institutional covenants of the EBRD loan agreement
   - Support to improve water utilities companies financial and operational performance (0.75 MECU)
   - Training and technical assistance support to proceed with corporatisation of water companies and to develop financial planning and management capacity in municipalities and judets (0.75MECU)
   - Technical assistance for development of municipal credit institutions and municipal creditworthiness (1.4 MECU)

Components 2 and 3 will be contracted by the PMU (or CFCU) within the Department of European Integration, and managed for technical implementation by the Ministry of Public Works and Regional Planning.

WIDER OBJECTIVES

- Assisting in design and supervision of works for water supply and wastewater infrastructure
- Assisting the project managers for their supervision of the installation/construction component of goods or work contracts

Municipal Utilities Development

The proceeds of the EBRD's loan will finance urgent environmental investment needs in five cities-Craiova, Targu Mures, Timisoara, Brasov and Iasi.

The projects consists of the rehabilitation of municipal water and sewerage services through network rehabilitation, consumer and system metering, water and energy conservation and the modernisation and upgrading of treatment and pumping plant.

The operational and financial performance of the water utilities in the cities will be also straightened.

The Romanian water companies have not previously financed investments through borrowing but always through central government grants transfers.

Funds will be now generated from water tariffs to meet debt-servicing obligations.

The project is setting a precedent for future private sector involvement by placing the water companies on a sound financial footing and creating a commercial outlook in both the water companies and the municipalities.

A mechanism will be established for the first time in Romania for the water companies to make adequate provision for assets maintenance and depreciation by the establishing of a special reserve fund.

5.2.2. Planned Projects

see Annex 10

Example: The attached lists identify priority projects in the areas of environment, they have been selected in the context of the coordination between the EC and the IFIs through screening of projects long lists on the basis of their relevance for the adopting of the aquis communautaire and their readiness for implementation.

Project name and description	Relevance to Communities Policies	Sponsoring IFI
To rehabilitate and upgrade The Bucharest Water Supply and Wastewater Treatment system	Urban Wastewater treatment directive, the water policy framework directive and the Drinking directive	EIB
Pollution abatement projects to straighten institutional capacity and the help the country comply with EU and environmental regulations bring about environmental public awareness and establishing a mechanism to finance environmental intervention in industries.	Harmonizing with EU environmental regulations, straightening of institutions	ERBD/EIB

6. Centralized National Institution/Development or Promotion Bank for Handling International Funds

Assessment of Main Weaknesses and Needs for Improvement

A National Fund for Investment Promotion and Institution Building was set up in the Ministry of Finance in order to make the necessary investments possible for the adaptation of Romanian infrastructure to the Community Acquis.

This support will concentrate on:

- Structural actions, covering in particular agricultural restructuring, regional investment in human and intellectual capital
- Compliance with Community norms, in particular as regards environment, agriculture, industry, occupational safety and health, transport and communications
- Co-financing of large scale infrastructure
- Small and medium enterprises development.

The National Fund for Investment Promotion will allocate the funds in parallel to its budgetary allocations-on the basis of Financing Agreements (i.e. Contracts) to projects and programmes through:

- Approved retailing mechanisms (i.e. Investments Funds, commercial banks or specialist government ministries and agencies)
- Directing to the contracting authority in the case of scale infrastructure projects.

All Phare investments support projects will be cofinanced with national budget resources channeled through National Fund for Investment Promotion together with the Phare funds or from private and IFI sources.

Co-operation between Romania and International Financial Institutions will receive new inputs and a new focus through the Accession Partnership.

Major efforts must be undertaken to advance the very low level of approximation of environmental legislation. There is a need to improve the sectors' administrative capacity to deal with environmental issues in a market economy. Particular attention should be given to the quick transposition of framework directives dealing with air, waste, water and the Integrated Pollution Prevention and Control directives, as well as the establishing of financing strategies for legislation in the water requiring major investments.

Overall, Romania will have to place higher priority on environmental issues, significantly increase related finance and develop its administrative and financing capacity. A considerable effort must be made to develop adequate implementation and enforcement structures. Public awareness with regard to the environment field must be stimulated.

7. Actual and Planned Public and Private Investment Portfolio for Water Quality and Water Management Programmes and Projects

7.1. Compilation of Actual and Planned Investment Portfolio

There are 53 projects proposed to be implemented in a short term (the year of 2000): 18 projects for municipality hot spots, 19 projects-for agricultural hot spots and 16 projects – for industrial hot spots (32 structural and 18 non-structural). The total cost for implementation of the projects proposed has been estimated to be about 588 million USD (at the exchange rate 8487 ROL).

Most of the structural projects are related to development of municipal, agricultural and industrial wastewater treatment plant, abatement of effects of accidental pollution and natural calamities, in the transboundary context. The non-structural projects are related mainly to legislation (harmonization with EU legislation).

7.2. Inventory of Actual and Planned Investment Portfolio

Water companies have not previously financed investments through borrowing but always through central government grant transfers.

7.3. Assessment of Main Weaknesses, Problems, Delay in Project Implementation

Generally, there is certain institutional capacity in the field of preparation of structural projects and less experience in preparing non-structural projects.

External technical and financial support is needed for implementing of these projects, for applying advanced water treatment technologies, training and procurement of new equipment.

In the water supply and wastewater sector, a very substantial volume of investment is needed to reverse the deterioration of infrastructure, raise service levels and improve compliance with environmental standards.

A coherent program of measures is required impacting on the institutional relationship between central and local government. The measures required include changes in the legislative framework to promote credit financing of local government, as well as practical programs building competence in the implementation of local managed investment programs, and in the operational and financial management of water companies and local government.

Annexes

Annex 1

Environmental Policies: short term 1998

ANNEX 1

ENVIRONMENT POLICIES: short term 1998

Priorities: to transpose the European Union environment regulations, especially those related to water quality and waste management; improving the law enforcement structures as well as decentralising the decision-making process in the environment protection institutional system

Policy objectives	Policy measures	Timetable	Financing (MECU)		
			Total	Of which	
				internal	external
To transpose the European Union environment regulation into the Romanian legislation[1]	Waste management Three UE regulations are to be transposed referring mainly to the related frame law, to waste transportation and to the dangerous waste treatment.(L)	2nd semester	0.08	0.03	0.05
	Water quality Two Community regulations are to be transposed referring waste waters and bathing water(L)	2nd semester	0.02	0.02	
	Nuclear safety Eight UE regulations are to be transposed which mainly establish the way to protect	2nd semester	0.08	0.08	

[1] The detailed timetable of the environment legislation harmonisation is enclosed in the Annex to this document and it includes all the Community regulations to be found in the relevant Community Acquis, not only those referring to the Internal Market

Policy objectives	Policy measures	Timetable	Financing (MECU)		
			Total	Of which	
				internal	external
	the population and the workers , the information system and the general safety standards.(L)				
	General framework -Decentralising decision-making in the environment protection institutional system, by drafting and adopting the adequate regulations and creating the mechanisms necessary to the co-operation between environment protection organisations and local authorities;(I)	2nd semester	1.18	0.68	0.5 (bilateral assistance)
Institutional development necessary for the implementation of harmonised environment protection legislation	- Improving the equipment of central and territorial environment protection structures with a view to enhancing their capacity and the efficiency of the monitoring and control activity.	2nd semester	0.425	0.425	
	-To adopt the licensing methodology for the	2nd	0.1	0.1	

Policy objectives	Policy measures	Timetable	Financing (MECU)		
			Total	Of which	
				internal	external
	environment protection laboratories;(I)	**semester**			
	-To create an interministry body to co-ordinate environment protection measures and actions;(I)	**2nd semester**	**0.01**	**0.01**	
	Permanent professional training and improvement(I)	**1st/2nd semesters**	**0.3**	**0.2**	**0.1 (bilateral assistance)**
	To instutionalize information and ecological awareness activities directed to the population by: - including environment knowledge in the curriculum - systematic spreading of the environment information; **To institutionalise the co-operation and participation of environment NGO's and of the population in the decision-making process on the environment protection(I)**	**1st/2nd semesters**	**0.3**	**0.3**	
	The necessary framework to implement the Community Acquis **-To create compartments to preserve the biodiversity as well as protected areas with the environment agencies and the**	**2nd semester** **1st**	**0.05**	**0.05**	

Policy objectives	Policy measures	Timetable	Financing (MECU)		
			Total	Of which	
				internal	external
	autonomous body which manages the forests; - To turn National Commission for Nuclear Activity Control (CNCAN) into an independent governmental agency.(I)	semester			
TOTAL			2.545	1.895	0.65

Annex 2

Environmental Policies

ANNEX 2. ENVIRONMENT POLICIES

Priorities: to transpose the EU environment regulations, mainly those referring to the quality of water and waste management; to improve the legislation enforcement structures and to decentralise the decision-making process within the environment protection institutional system.

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
To transpose the EU environment regulations in the Romanian legislation[3]	General laws - Four EU regulations are to be transposed, referring mainly to the impact, the assessment of the impact and the environment-related information. (L)	II/1999, II/2000	0.24	0.04	0.2

[2] Cost estimation to carry out the investments necessary to reach the EU environment standards will be carried out within the DISAE Facility Programme, taking into the account the expenses needed to implement each EU environment regulation which will be transposed in the Romanian legislation.

[3]The detailed Timetable of the environment legislation harmonisation is presented in the Annex to this document and encloses all EU regulations in the relevant Community Acquis, not only those referring to the Internal Market.

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	Air quality - In this respect, nine EU regulations are to be transposed referring mainly to the emissions caused by car motors, the furel composition and the existence of various chemical substances in the atmosphere. (L)	II/1999, II/2000	0.09	0.09	
	Waste management - Ten EU regulations are to be transposed referring to waste packing, storing and despising as well as to the treatment of special waste. (L)	II/1999, II/2000	0.1	0.1	
	Water quality - Eight EU regulations are to be transposed referring mainly to the conditions each water category has to meet(L)	I,II/1999, I/2000	0.13	0.08	0.05

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	Protection of nature - Four EU regulations are to be transposed referring mainly to the treatment of specific animal species, the protection of special areas and the protection of forests against pollution. (L)	I/1999	0.04	0.04	
	Controlling industrial pollution and risks - Six EU regulations are to be transposed, having an impact on industrial pollution (IPPC, Seveso etc.). (L)	II/2000	0.11	0.06	0.05

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	Chemical substances and the genetically modified organisms Eighteen EU regulations are to be transposed referring mainly to classification, packing, labelling and transportation of dangerous chemical substances, their import and export, as well as the treatment of genetically modified organisms and of the substances, which exhaust the ozone layer. (L)	**II/1999, I,II/2000 II/2001**	**0.18**	**0.18**	

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	Noise emissions Thirteen EU regulations are to be transposed having an impact on the noise emissions of various categories of vehicles, installations and cars (L)	II/2000	0.13	0.13	
To develop the necessary agencies to implement the harmonised environment legislation	General framework -To further improve the endowment of the central and territorial environment structures so as to increase the capability and the efficiency of monitoring and controlling ; (I)	I/1999-II/2000	1.7	0.7	1.00[4]
	To improve the warning system on the possible risks of accidental cases of pollution and their prevention; (I)	I/2000	1.5	0.5	1.00[5]

[4] (PHARE)

[5] (PHARE)

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	Tu further carry out training and retraining activities. (I)	I/1999-II/2000	0.6	0.3	0.3[6]
	The necessary framework to implement the EU Acquis -To draft and apply the strategies to implement the transposed EU regulations (I)	I/1999-II/2000	0.95	0.45	0.5[7]
	To create or complete the administrative structures required applying and controlling compliance with the harmonised environment legislation. (I)	I/1999-II/2000	1	0.5	0.5[8]
	To create the National Agency Monitoring the Environment Radioactivity ; (I)	II/1999	0.35	0.1	0.25[9]

[6] (PHARE)

[7] (PHARE)

[8] (PHARE)

[9] (PHARE)

Policy objectives	Policy measures	Timetable (1st, 2nd semesters/99) 1st, 2nd semesters /2000	Financing[2] MECU		
			Total	Of which:	
				internal	external
	To create the National Environment Investment Fund (I)	I/1999	0.15	0.05	0.1[10]
	To consolidate and capitalise the National Environment Investment Fund (I)	II/1999	45	5	40[11]
TOTAL			52.27	8.32	43.95

[10] (PHARE)

[11] (PHA-RE+IRDB)

Annex 3

Timetable for the Legislative Approximation in Environmental Protection in the period 1998-2000

ANNEX 3 TIMETABLE FOR THE LEGISLATIVE APPROXIMATION IN ENVIRONMENTAL PROTECTION IN THE PERIOD 1998-2000

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
	A. GENERAL LEGISLATION			
1	**85/337/EEC-evaluation of environmental impact**	**II/2000**	**GD**	**MWFEP**
2	**90/313/EEC-environmental information**	**II/1999**	**Order**	**MWFEP**
3	**91/692/EEC-reporting**	**II/1999**	**Order**	**MWFEP**
4	**EEC/1210/90-European Environmental Agency**	**IV/1999**	**Order**	**MWFEP**
5	**EEC/1836/93- LIFE programme**			
	B. AIR QUALITY			
	1. WHITE PAPER			
6	**70/220/EEC-(13)-emission of exhaust gases from motor vehicles**	**II/2000**	**GD**	**MWFEP MIT+MT**
7	**72/306/EEC-(2)-emission of exhaust gases from Diesel engines (soot)**	**II/2000**	**GD**	**MWFEP MIT+MT**
8	**88/77/EEC-(2)-emission of exhaust gases from Diesel engines**	**II/2000**	**GD**	**MWFEP MIT+MT**
9	**92/55/EEC-tests for emissions of exhaust gases**	**II/2000**	**Order**	**MWFEP MT**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
10	**94/63/EC- C.O.V. emissions**	**II/1999**	**Order**	**MWFEP MIT**
11	**85/210/EEC-(2)- lead content of petrol**	**II/2000**	**Order**	**MWFEP MIT**
12	**93/12/EEC- sulphur content of fuel**	**II/2000**	**Order**	**MWFEP MIT**
	2. OTHER LEGISLATION			
13	**96/62/EC-air quality -80/779/EEC-(4)-sulphur -85/203/EEC-(3)-NO -82/884/EEC-(2)-Pb**	**II/1999**	**Order**	**MWFEP MH**
14	**92/72/EEC- pollution of ozone layer**	**II/1999**	**Order**	**MWFEP**
	C. WASTE MANAGEMENT			
	1. WHITE PAPER			
15	**75/439/EEC-(2)-eliminating oil waste**	**II/1999**	**Order**	**MWFEP MIT+MT**
16	**75/442/EEC-(3)-framework directive**	**II/1998**	**Law**	**MWFEP**
17	**96/59/EC-eliminating PCB and PCT**	**II/2000**	**Order**	**MWFEP MIT**
18	**91/689/EEC-(1)-dangerous waste**	**II/1998**	**Order**	**MWFEP**
19	**86/278/EEC-(1)-muds**	**II/1999**	**Order**	**MWFEP MAF**
20	**91/157/EEC-(1)-batteries**	**II/2000**	**Order**	**MWFEP MIT**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
21	**94/62/EC-packaging waste**	**II/2000**	**Order**	**MWFEP MIT**
22	**EEC/259/93-(1)-Regulations on waste transport**	**II/1998**	**GD**	**MWFEP**
	2. OTHER LEGISLATION			
23	**78/176/EEC-(3) - industrial titanium dioxide discharges**	**II/1999**	**Order**	**MWFEP MIT**
24	**89/429/EEC-waste incineration in current installations**	**II/2000**	**Order**	**MWFEP**
25	**89/369/EEC-waste incineration in new installations**	**II/2000**	**Order**	**MWFEP**
26	**94/62/EC-waste packaging**	**II/2000**	**Order**	**MWFEP**
27	**94/67/EEC-incinerating dangerous waste**	**II/2000**	**Order**	**MWFEP**
	D.WATER QUALITY			
	1.WHITE PAPER-no			
	2.OTHER LEGISLATION			
28	**91/271/EEC- waste water**	**II/1998**	**GD**	**MWFEP MPW MH**
29	**91/676/EEC-nitrates**	**I/1999**	**GD**	**MWFEP MAF**
30	**76/464/EEC-(9)-discharge of dangerous substances in water**	**II/1999**	**GD**	**MWFEP**
31	**76/160/EEC-(1)-bathing water**	**II/1998**	**Order**	**MH**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
32	**80/778/EEC-(3)-drinking water**	**II/1999**	**Order**	**MH**
33	**75/440/EEC-(3)- identifying water sources for drinking water**	**II/1999**	**MWFEP +MH Order**	**MWFEP MH**
34	**79/869/EEC-(1)-measurements and identifying drinking water resources**	**II/1999**	**MWFEP +MH Order**	**MWFEP MH**
35	**80/68/EEC-(2)-underground water**	**I/2000**	**GD**	**MWFEP**
36	**78/659/EEC-water for fisheries**	**I/2000**	**GD**	**MWFEP**
37	**79/923/EEC-(1)-shellfish waters**	**I/2000**	**GD**	**MWFEP**
	E. ENVIRONMENTAL PROTECTION			
	1. WHITE PAPER-no			
	2. OTHER LEGISLATION			
38	**92/43/EEC-habitats**	**I/1999**	**Law**	**MWFEP**
39	**79/409/EEC-(50)-wild birds**	**I/1999**	**Law**	**MWFEP**
40	**83/129/EEC-(2)-seal hide products**			
41	**338/97/EC Reg.-(1)-endangered species**			
42	**348/81/EEC Reg.-whale import**			
43	**90/3943/EEC Reg. Protection of the Arctic region**			
44	**EEC/3254/91-(1)-foot traps**			
45	**EEC/3528/86 Reg-(8)-preventing forest pollution**	**I/1999**	**GD**	**MWFEP**
46	**EEC/2158/92 Reg-(3)- preventing forest fires**			**MWFEP**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
	F. CONTROL OF INDUSTRIAL POLLUTION AND RISK			
	1. WHITE PAPER-no			
	2. OTHER LEGISLATION			
47	**84/360/EEC-(2)-air pollution in industrial activities**	**II/2000**	**Order**	**MWFEP MIT**
48	**88/609/EEC-(2)-great incinerators**	**II/2000**	**Order**	**MWFEP MIT**
49	**96/61/EC-IPPC**	**II/2000**	**GD**	**MWFEP**
50	**96/82/EC-SEVESO**	**II/2000**	**GD**	**MWFEP**
51	**EEC/880/92 Reg.-(12)- Eco-Label**	**II/2000**	**Order**	**MWFEP MIT**
52	**EEC/1836/93-EMAS**	**II/2000**	**Order**	**MWFEP**
	G. CHEMICAL SUBSTANCES AND GENETICALLY MODIFIED MICRO-ORGANISMS			
	1.WHITE PAPER			
53	**67/548/EEC-(34)-classification, packaging and labelling of dangerous substances**	**II/1999**	**GD**	**MWFEP MIT MH**
54	**88/379/EEC-(7)-classification, labelling and packaging of dangerous substances**	**II/1999**	**GD**	**MWFEP MIT MH**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
55	**76/769/EEC-(19)-Restrictions in the trading and use of dangerous substances and their preparation**	**I/2000**	**GD**	**MWFEP**
56	**90/220/EEC-(2)- deliberate GMO (genetically modified MITro-organisMH) discharge**	**II/1999**	**Law**	**MAF**
57	**73/404/EEC-(2)-detergents**	**II/1999**	**MWFEP +MIT Order**	**MWFEP MIT**
58	**94/55/EC-road transport of dangerous goods**	**II/1999**	**Order**	**MWFEP MIT**
59	**EEC/793/93 Regulation –current substances**	**II/2000**	**GD**	**MWFEP**
60	**EC/1488/94 Regulation Establishing principles in risk assessment**	**II/2001**	**Order**	**MWFEP**
61	**EC/1179/94 Regulation - first list of priority substances**	**II/2001**	**Order**	**MWFEP**
62	**EC/2268/95 Regulation – second list of priority substances**	**II/2001**	**Order**	**MWFEP**
63	**142/97/EC and143/97/EC Regulation - third list of priority substances**	**II/2001**	**Order**	**MWFEP**
64	**EEC/2455/92 Regulation –import and export of dangerous chemical substances**	**II/1999**	**GD**	**MWFEP**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
65	**EC/3093/94 Regulation –gases contributing to the depletion of the ozone layer**	**II/1998**	**GD**	**MWFEP**
	2. OTHER LEGISLATION			
66	**86/609/EEC-animal experiments**	**II/2000**	**GD**	**MAF**
67	**87/18/EEC-laboratory methods for inspection activities**	**II/2000**	**GD**	**MWFEP**
68	**94/51/EC-limited use of GMO**	**II/2000**	**GD**	**MAF**
69	**87/217/EEC-asbestos**	**II/2000**	**Order**	**MWFEP**
	H. NOISE EMISSIONS			
	1. WHITE PAPER			
70	**70/157/EEC-(9)-from vehicle engine**	**II/2000**		**MPW**
71	**78/1015/EEC-(2)-from bicycle engines**	**II/2000**		**MPW**
72	**79/113/EEC-(2)-industrial buildings**	**II/2000**		**MPW**
73	**80/51/EEC-(1)- subsonic planes**	**II/2000**		**MT**
74	**89/629/EEC-(1)- subsonic reactors**	**II/2000**		**MT**
75	**84/532/EEC-agreement on construction and equipment**	**II/2000**		**MPW**
76	**84/533/EEC-(1)-compressors**	**II/2000**		**MPW**
77	**84/534/EEC-(1)-tower cranes**	**II/2000**		**MPW**
78	**84/535/EEC-(1)- electric generators**	**II/2000**		**MPW**
79	**84/537/-(1)-compressed-air hammers**	**II/2000**		**MPW**
80	**84/538/EEC-(93)-grass-mowers**	**II/2000**		**MIT**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
81	**86/662/EEC-(2)-hydraulic excavators**	**II/2000**		**MPW**
82	**86/594/EEC-household appliances**	**II/2000**		**MIT**
	2. OTHER LEGISLATION -no			
	I. NUCLEAR SAFETY			
	1. WHITE PAPER			
84	**92/3/EURATOM-(1) transport of radioactive waste**	**I/1998**	**MWFEP Order**	**NCNAC**
85	**96/29/EURATOM-general safety standards**	**I/1998**	**MWFEP Order**	**NCNAC**
	87/3954/EURATOM Regulation admissible levels of radioactive contamination of foodstuffs following nuclear accidents			**MAF**
87	**90/737/CEE-(2)-import of foodstuffs following the Chernobyl accident**			**MAF**
88	**93/1493/EURATOM-transport of radioactive substances**	**I/1998**	**MWFEP Order**	**NCNAC**
	2. OTHER LEGISLATION			
89	**80/836/EURATOM-(1)-population and worker protection**	**II/1998**	**MWFEP and MH Order**	**MH NCNAC**
90	**84/466/EURATOM- radioactive protection of patients**	**II/1998**	**Order**	**NCNAC**
91	**87/600/EURATOM-information exchange in case of nuclear accidents**	**II/1998**	**MWFEP Order**	**NCNAC**

No.	MEASURES	DEADLINE	TYPE OF REGULATION PROPOSED	RESPONSIBLE AUTHORITY
92	**89/618/EURATOM-informing the population**	**II/1998**	**MWFEP Order**	**NCNAC**
93	**90/641/EURATOM-protection of external workers**	**II/1998**	**Order MWFEP**	**NCNAC**

NOTES

-Deadlines is given in semesters.

-List of abbreviations:

- **MWFEP- Ministry of Waters, Forests and Environmental Protection**
- **MAF-Ministry of Agriculture and Food**
- **MH-Ministry of Health**
- **MIT-Ministry of Industry and Trade**
- **MT-Ministry of Transports**
- **NCW- National Council of Waters**
- **SCNE-State Commission for Nuclear Energy**
- **NCNAC - National Commission for Nuclear Activity Control**
- **MPW - Ministry of Public Works**
- **GD-Government Decision**
- **Order-Regulation issued by Order of the Minister**

-The timetable for legislative approximation includes 93 items, of which:

***37 Directives mentioned in the White Paper**

***38 Directives mentioned in other Community Acquis**

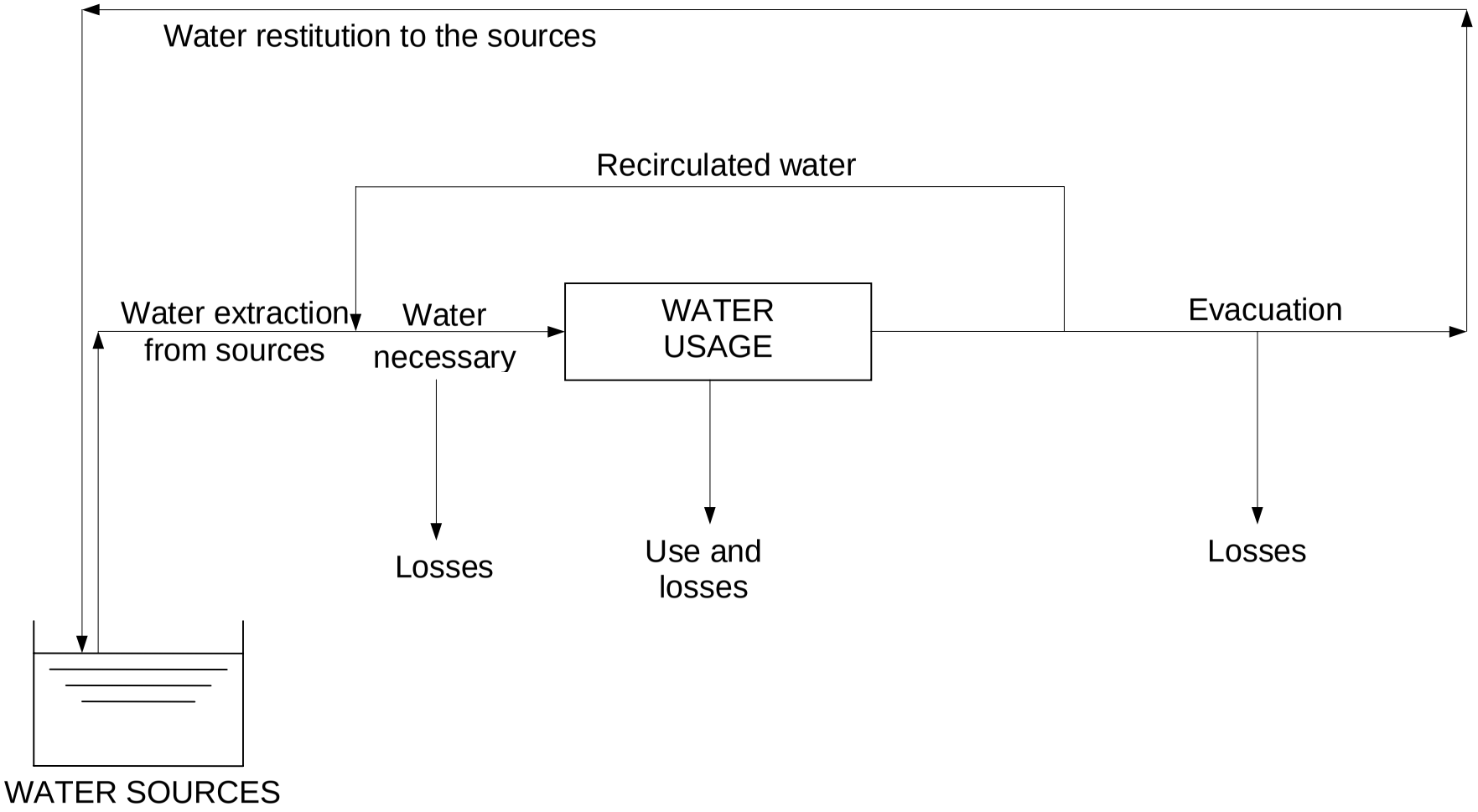
***18 Regulations**

TOTAL 93

Annex 4

Water Circuit between Destination and Sources

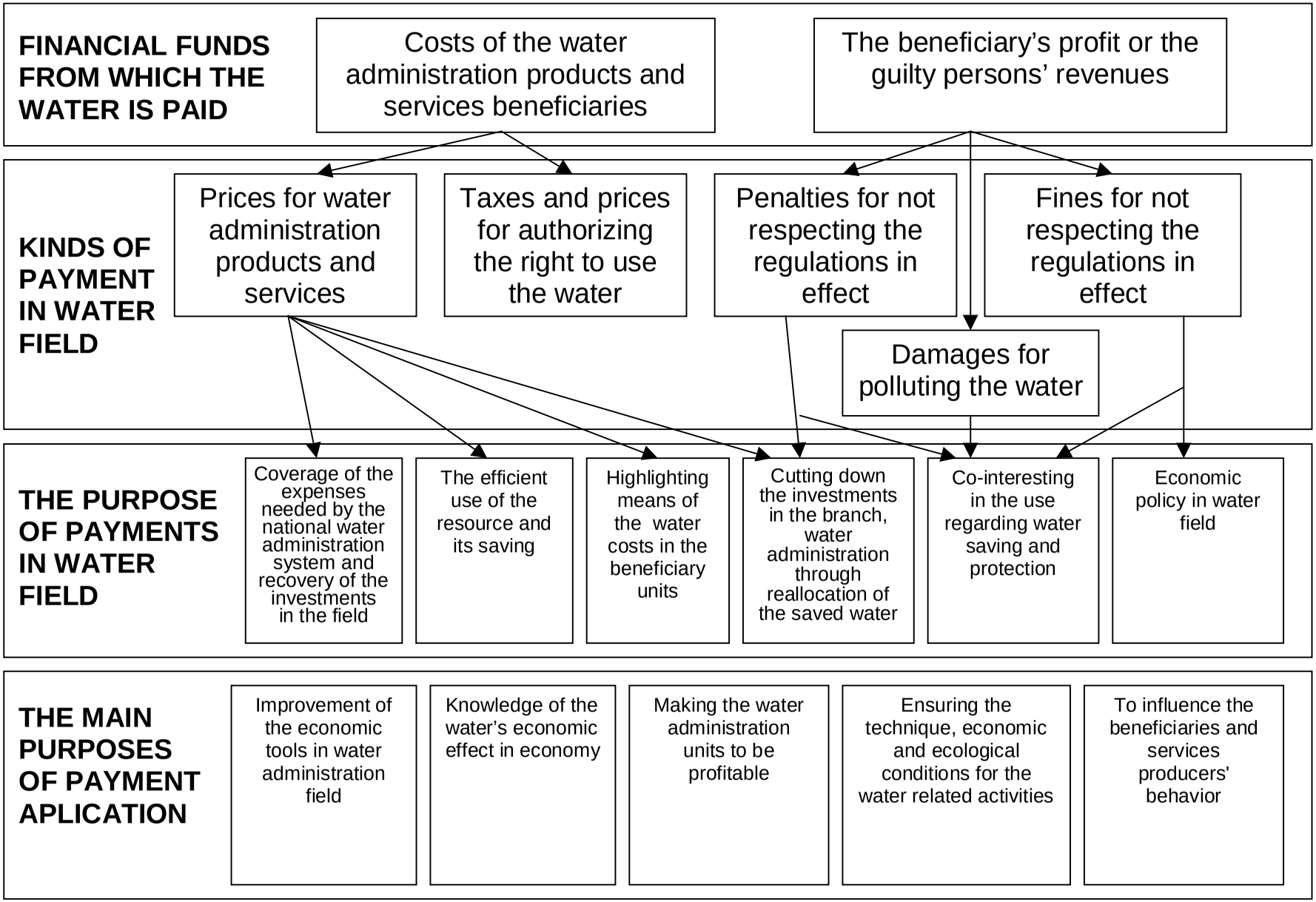
Water Circuit between Destination and Sources



Annex 5

The Main Functions and Purposes of the Payment in Water Field

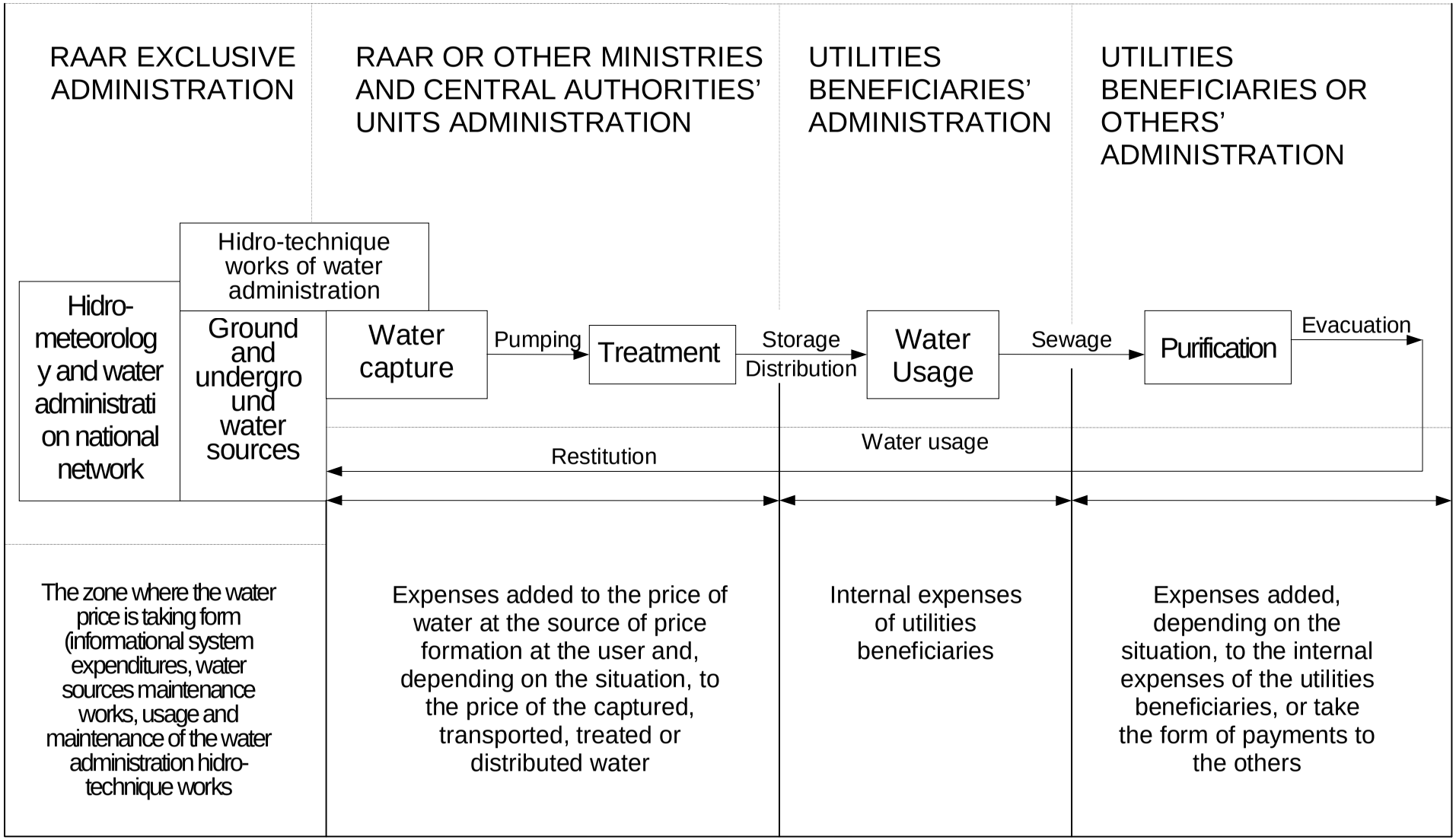
The Main Functions and Purposes of the Payments in Water Field



Annex 6

Distribution of the Expenses for Ensuring the Water at the Sources and to the Users

Distribution of the Expenses for Ensuring the Water at the Sources and to the Users



Annex 7

Cost of Raw Water Delivered to Users

ANNEX 7

Cost of Raw Water Delivered To Users

Water users	*Cost (ROL/1000 mc raw water)*	*Cost per 1USA $ (1$=8478 ROL)*
1. Inland Rivers		
1.1 Industry, Agriculture(except Irrigation, and power plant and Cogeneratin with limited water resources	*63586*	*7,50*
1.2 Irrigation and Fisheries	*843*	*0,10*
1.3 Power Plants and Cogeneration other than those mentioned at p 1.1	*453*	*0,05*
1.4Public Administration	*23315*	*2,75*
1.5 Other Title Holders	*63586*	*7,50*
2. Danube River		
2.1 Industry, Agriculture(except Irrigation, and power plant and Cogeneration with limited water resources	*7628*	*0,90*
2.2 Irrigation and Fisheries	*173*	*0,02*
2.3 Public Administration	*4483*	*0,53*
2.1 Other Title Holders	*7628*	*0,90*
3. Ground Water		
3.1 Industry, Agriculture(except Irrigation, and power plant and Cogeneration with limited water resources	*76268*	*9,00*
3.2 Irrigation and Fisheries	*17853*	*2,11*
3.3 Power Plants and Cogeneration other than these mentioned at p 1.1	*3080*	*0,36*
3.4Public Administration	*23702*	*2,80*
3.5 Other Title Holders	*78268*	*9,23*

ANNEX 7

Tarrifs for sevices of water management

1 USD=8478 ROL

Service of Water Management	*UM*	*Tarriff(USD-UM)*	*Tarriff(ROL-UM)*
1. Reception into the surface water of the substances discharged within the permissible legal limits			
1.1 For suspensions and substances contained in solutions (all parameters indicated in the authorisation)	tonne	2,48	21013
1.2 For oxygen consuming Substances	tonne	10,02	84987
2. Concentration of the hydroenergetic potential through dams			
2.1 For medium head assured by dams	m head		
-in power plants with less than 4 MW installed power	m head	44,91	380772
-in power plants with between 4 MW and 8 MW installed power	m head	60,37	511826
-in power plants above 8 MW installed power	m head	74,42	630916
2.2 For the water volume used		0,00	

-in power plants with less than 4 MW installed power	10000 cu.m	0,09	776
-in power plants with between 4 MW and 8 MW installed power	10001 cu.m	0,12	1058
-in power plants above 8 MW installed power	10002 cu.m	0,20	1713

Annex 8

Medium Cost of the Raw Water for the Whole Country and for Each Water Shead (LEI and USD)

Medium cost of the raw water for the whole country and for each water shead (LEI)

- 1998 -

Specification/Branch	Measurement Unit	Cluj	Oradea	Mures	Timisoara	Craiova	Valcea	Pitesti	Buzau	Bacau	Iasi	Constanta	Stanca	TOTAL REGIE
Total expenditure according to BVC	million LEI	27,50	14,00	35,60	18,20	21,15	38,78	47,00	39,40	32,80	28,50	16,90	3,90	323,73
BVC expenditure	million LEI	22,90	13,00	28,10	17,60	18,60	27,30	40,50	22,30	22,00	23,50	16,90	3,10	255,80
Volume of water supplied 1998	million cubic metres	407,00	221,00	1045,00	245,00	1582,00	500,00	1102	583,00	601,00	124,00	1999,00	114,00	8523,00
Medium cost BVC	LEI/cubic metre	56,27	58,82	26,89	71,84	11,76	54,60	36,75	38,25	36,60	189,52	8,45	27,19	30,02
Total expenditure according to the standards	million LEI	51,15	33,00	84,09	33,70	31,50	55,06	76,00	82,30	72,58	53,01	25,35	7,08	604,82
Standard expenditure	million LEI	42,90	28,88	70,07	32,50	25,38	37,89	68,29	61,23	50,06	47,45	25,35	5,98	495,98
Standard medium expenditure	LEI/cubic metre	105,40	130,68	67,05	132,65	16,04	75,78	61,97	105,03	83,29	382,66	12,68	52,46	58,18

Medium cost of the raw water for the whole country and for each water shead (USD)

- 1998 -

Specification/Branch	Measurement Unit	Cluj	Oradea	Mures	Timisoara	Craiova	Valcea	Pitesti	Buzau	Bacau	Iasi	Constanta	Stanca	TOTAL REGIE
Total expenditure according to BVC	USD	3243,7	1651,3	4199,1	2146,733	2494,69	4574,2	5543,8	4647,3	3868,8	3362	1993,395	460,014	38184,71
BVC expenditure	USD	2701,1	1533,4	3314,5	2075,961	2193,91	3220,1	4777,1	2630,3	2595	2772	1993,395	365,652	30172,21
Volume of water supplied 1998	million cubic metres	407,00	221,00	1045,00	245,00	1582,00	500,00	1102	583,00	601,00	124,00	1999,00	114,00	8523,00
Medium cost BVC	USD/cubic metre	6637,2	6938	3171,7	8473,697	1387,12	6440,2	4334,7	4511,7	4317,1	22354	996,6973	3207,12	3540,929
Total expenditure according to the standards	USD	6033,3	3892,4	9918,6	3974,994	3715,5	6494,5	8964,4	9707,5	8561	6253	2990,092	835,103	71339,94
Standard expenditure	USD	5060,2	3406,5	8264,9	3833,451	2993,63	4469,2	8055	7222,2	5904,7	5597	2990,092	705,355	58502,01
Standard medium expenditure	USD/cubic metre	12432	15414	7908,7	15646,38	1891,96	8938,4	7309,5	12389	9824,3	45136	1495,636	6187,78	6862,468

Evolution of the contracted and supplied water volume 1991-1994 for RAAR

	1991		1992		1993		1994	
	contracted	supplied	contracted	supplied	contracted	supplied	contracted	supplied
Interior river water	7028	4931	6571	4164	7056	4438	5280	4338
Underground water	1907	1766	2315	1936	2445	1864	1864	1780
Danube water	1551	1313	1379	1165	1733	1218	1218	1149
Total for annex	10486	8010	10265	7265	11234	7520	8362	7267

Evolution of the contracted and supplied water volume 1995-1997 and prognosis for 1998

	1995		1996		1997		1998
	contracted	supplied	contracted	supplied	contracted	supplied	prognosis
Interior river water	6561	5976	6271	5802	6103	5594	5594
Underground water	2191	2504	5420	3375	5415	2247	2247
Danube water	1266	1196	1374	1190	1369	1153	1153
Total for annex	10018	9676	13065	10367	12887	8994	8994

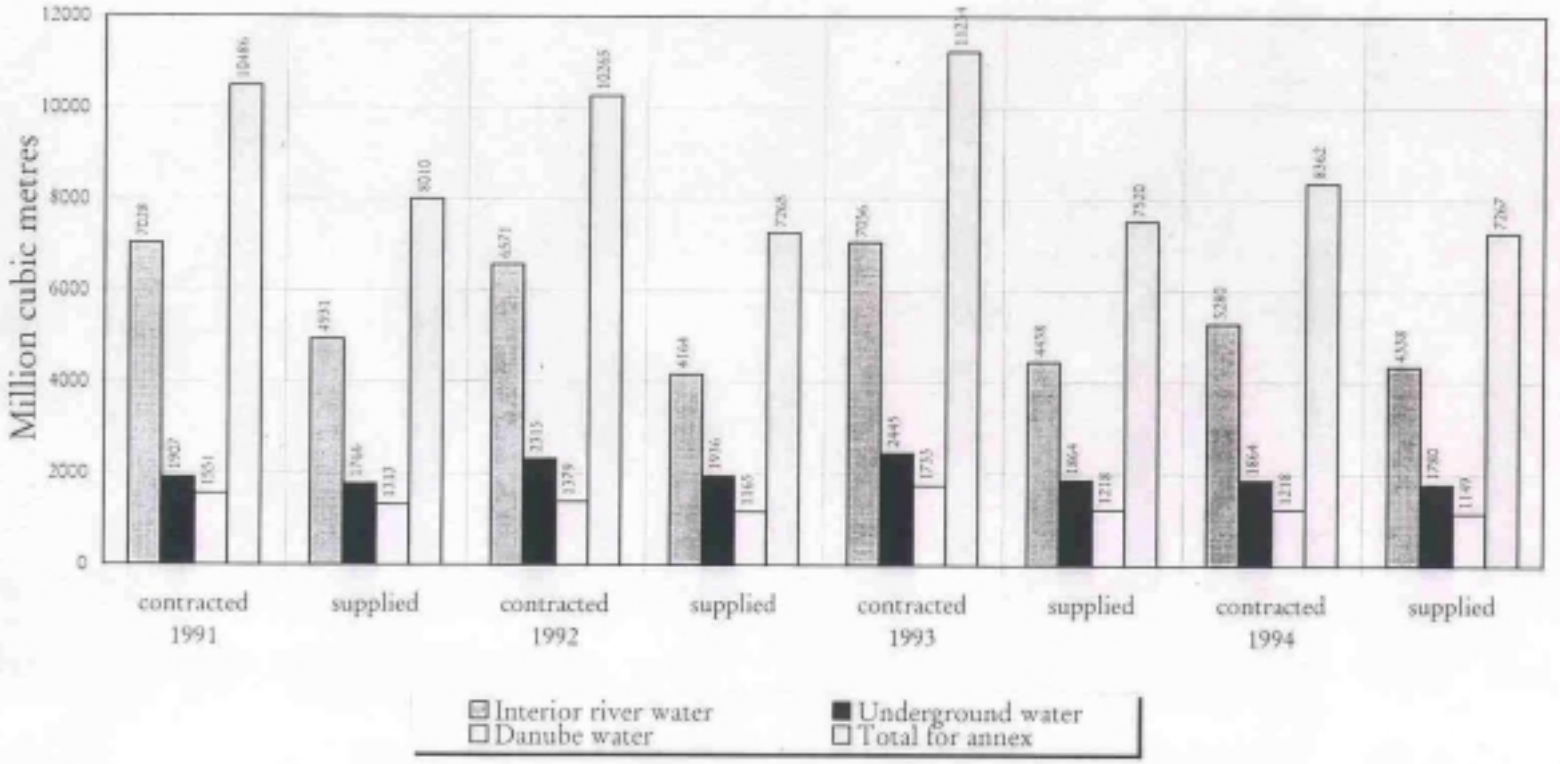
Revenue evolution in 1997 (LEI)

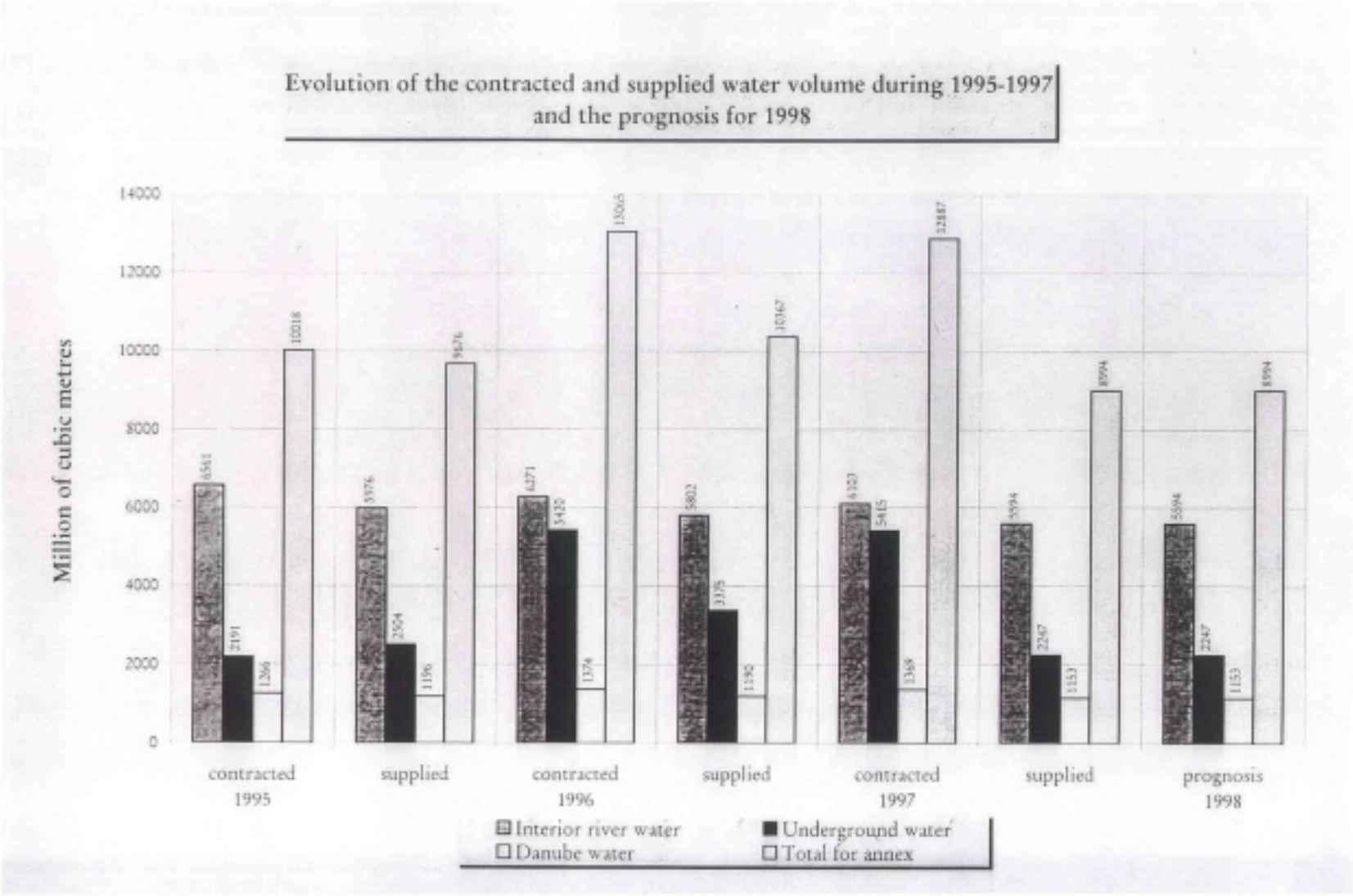
	January	February	March	April	May	June	July	August	September	October	November	December
Total revenue	8969	16451	25835	39869	55230	72641	89479	114567	135593	164182	203060	224235
Total debt	35659	29353	33817	37900	46841	50014	56633	59815	68170	66806	55263	56308

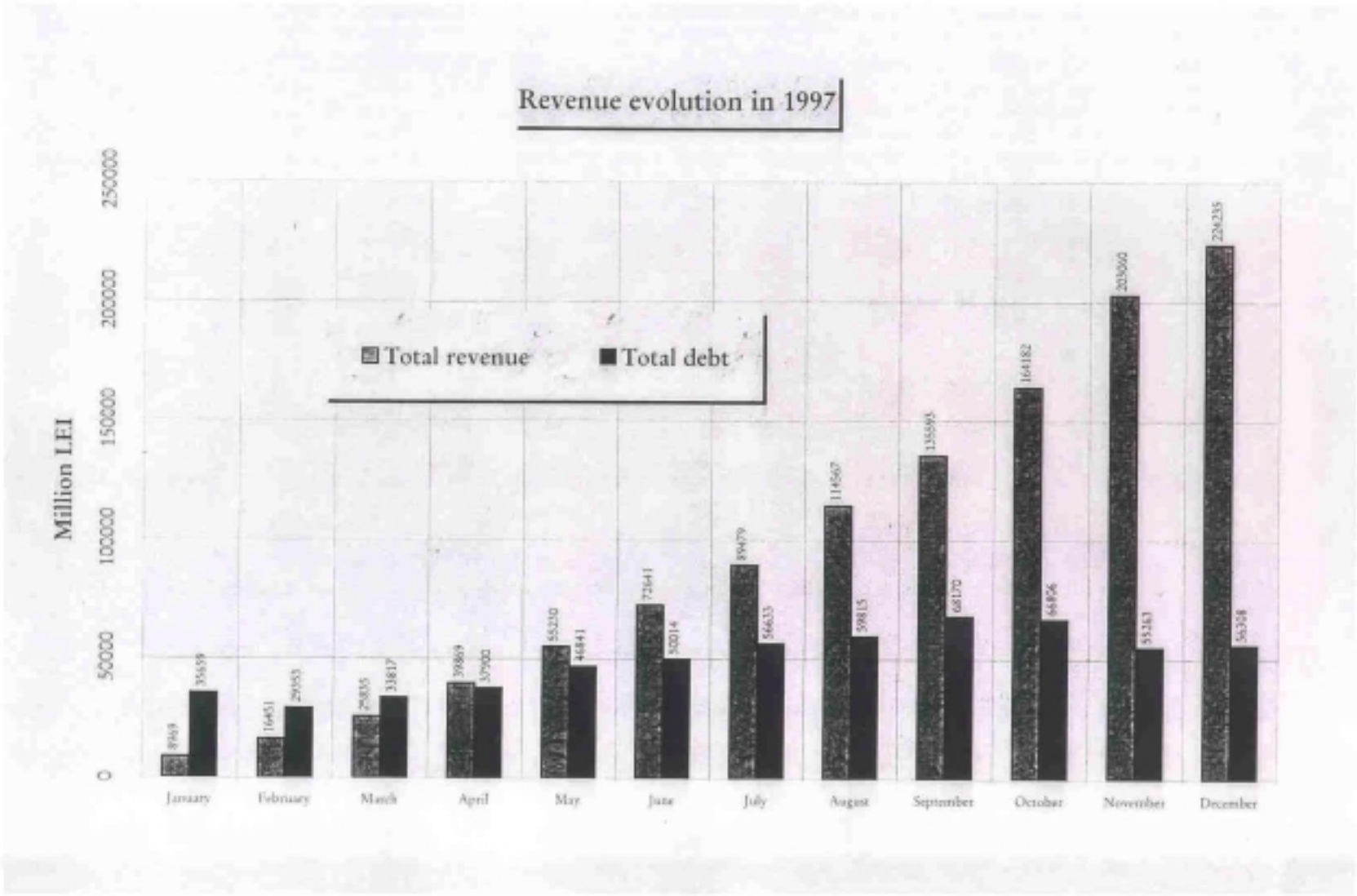
Revenue evolution in 1997 (USD)

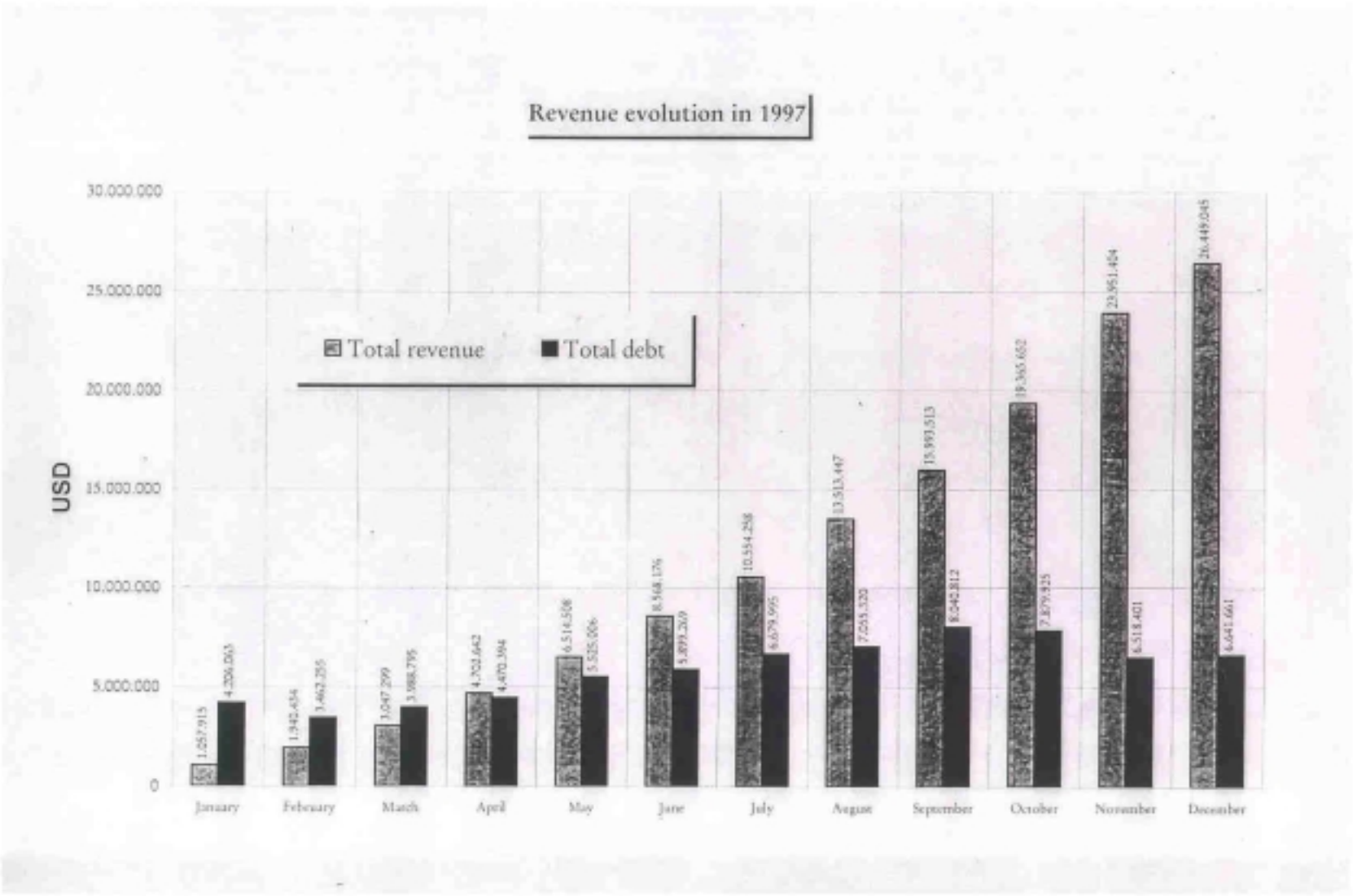
	January	February	March	April	May	June	July	August	September	October	November	December
Total revenue	1.057.915	1.940.434	3.047.299	4.702.642	6.514.508	8.568.176	10.554.258	13.513.447	15.993.513	19.365.652	23.951.404	26.449.045
Total debt	4.206.063	3.462.255	3.988.795	4.470.394	5.525.006	5.899.269	6.679.995	7.055.320	8.040.812	7.879.925	6.518.401	6.641.661

Evolution of the contracted and supplied water volume
during 1991-1994 period




Evolution of the contracted and supplied water volume during 1995-1997 and the prognosis for 1998
Million of cubic metres
14000
12000
10000
8000
6000
4000
2000
0
6561
2191
1366
10018
5976
2554
1196
9676
6371
5429
1374
13065
5802
3375
1192
10367
6323
5415
1369
12887
5594
2247
1153
8994
5594
2247
1153
8994
contracted 1995
supplied
contracted 1996
supplied
contracted 1997
supplied
prognosis 1998
Interior river water
Underground water
Danube water
Total for annex


Revenue evolution in 1997
Million LEI
0
50000
100000
150000
200000
250000
Total revenue
Total debt
8969
35659
16451
29353
29835
33817
39869
37900
55220
46841
72641
58014
89479
66633
114567
90815
136693
68170
164182
66856
203060
55263
224235
56358
January
February
March
April
May
June
July
August
September
October
November
December


Revenue evolution in 1997
Total revenue
Total debt
USD
30.000.000
25.000.000
20.000.000
15.000.000
10.000.000
5.000.000
0
1.657.915
4.204.063
1.945.454
3.462.255
3.047.299
3.988.795
4.702.642
4.470.394
6.514.506
5.525.006
8.568.176
5.899.269
10.554.258
6.679.995
13.513.447
7.055.333
15.993.513
8.042.812
18.365.652
7.879.925
23.951.454
8.518.401
26.449.045
6.641.661
January
February
March
April
May
June
July
August
September
October
November
December

Annex 9

Penalties Paid for Deviations from the Norms Concerning the Water's Prelevetion from Sources

Penalties Paid for Deviations from the Norms Concerning the Water's Prevelation from Sources

KIND OF DEVIATION	SIZE OF DEVIATION	LEVEL OF PENALTIES
1. Exceeding the extracted volumes or discharges foreseen in the valid regulations or in the contract	between 10% until 20% between 20% until 50% over 50%	2 times delivery price 3 times delivery price 4 times delivery price
2. Exceeding the extracted volumes or discharges during the restriction periods foreseen in the legal approved schedules by the water management units.	between 10% until 20% between 20% until 50% between 50% until 75% over 75%	2 times delivery price 3 times delivery price 4 times delivery price 6 times delivery price
3. Extraction from groundwater of volumes exceeding the quantities foreseen by the legal regulations	volume	5 times delivery price
4. A. Extraction of water from surface or groundwater sources without legal regulations	volume	10 times delivery price
B. Using products and services without contract	volume	10 times delivery price
5. Using water in a different purpose as foreseen by the legal regulations	volume	3 times delivery price
6. Exceeding the mean daily values of quality parameters defined by the legal regulations	Differences between values of the qualities indicators achieved and values from the legal regulation	ROL/KG
- Total suspensions	Per Kg	47,84
- Chlorides, sulphides, magnesium, sodium, Calcium,	Per Kg	72,84
- Nitrates, organic substances (CCOCr, CBO5)	Per Kg	96,40
- Ammonium, nitrites, cobalt,	Per Kg	214,8
- trivalent cobalt, detergents, active anions, fluorine, iron	Per Kg	479,25
- ammoniac, phosphor, manganese, nickel, products extracted from petroleum ethers	Per Kg	958,55
- chromium, molybdenum,	Per Kg	2875,65
- lead, copper, zinc, sulphite or sulphuric hydrogen,	Per Kg	9588,5
- silver, arsine, selenium,	Per Kg	19180,5

- cyanides, - residual free chlorine (Cl_2), - cadmium, phenols, nitritilebenzen, 7. Substances with special toxic effect which are forbidden by law to be discharged into the water sources - Mercury - Pesticides with persistent halogen compounds	Per Kg Per Kg Per Kg Per Kg Per Kg	28768,65 38360 47948 575377 958970

1 USD=8478 ROL

Annex 10

Compilation of Planned Investment Portfolio (million US$)

Annex 10: COMPILATION OF INVESTMENT PORTFOLIO (Million US$)

No	Type/name of Project or Program	Total Capital Requirements		Funding Period	National Funding Sources											International Funding			Remarks
					Equity	Envir. Fund	Water Manag. Fund	Public Loans Central Budget	Public Loans Reg. Budget	Public Loans Local Budget	Public Grants Central Budget	Public Grants Reg. Budget	Public Grants Local Budget	Comm. Bank Loans	Others	Organisation	Grant	Loan	
		(MNC)	(MUS$)		(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)		(MUS$)	MUS$)	
1	Harmonization of EU regulation of emmission in water with the national standards (non structural)		0,0250	1998							211,95								ongoing
2	Support for monitoring reference laboratories (non structural)		0,9280								7867,584								ongoing
3	WWTP- Craiova Modernization (Structural)		3,2									27129,6							ongoing
4	Environment territorial laboratories development (Non structural)		0,353								2992,734								ongoing
5	Quality objectives in the activity of water quality (Non structural)		0,284								2407,752								ongoing
6	Control and fight against accidental pollution (Non structural)		0,1								847,8								planned
7	Introduction of new instruments for quality water protection (Non structural)		0,2625								2225,475								planned
8	Expansion of WWTP from Mangalia city (Structural)		5,40					45781,2											ongoing
9	WWTP of Braila Nord (Structural)		21,90					185668,2											ongoing
10	WWTP of Galati city (Structural)		29,50					250101											ongoing
11	WWTP of Zalau city (Structural)		7,00						59346										ongoing
12	Development of WWTP of Resita city (Structural)		3,50									29673							ongoing
13	Development of WWTP of Campulung Muscel city (Structural)		1,50									12717							ongoing
14	Development of WWTP of Deva city (Structural)		5,60									47476,8							ongoing
15	Guidelines on designing and operation of urban waste land fill (Non structural		0,125								1059,75								planned
	TOTAL		**79,6775**																
	PROJECTS FOR AGRICULTURAL HOT SPOTS																		
16	Technologies of reclamation of agricultural soils affected by oil and salty water pollution (Non structural)		0,75									6358,5							planned
17	Ecological reconstruction of agricultural soils - Baia Mare (Structural)		1								8478								planned
18	Afforestation in the Copsa Mica area (Structural)		3,142								26637,88								ongoing
19	Agricultural turning to good account of zootechnical waste at RONSUIN TEST PERIS (Structural)		1,297								10995,97								planned

20	Capacity increase of WWTP of COMTOM TOMESTI (Structural)		10		84780														ongoing
21	Recycling and management of available waste from breeding farms (Structural)		2,46								20855,88								planned
22	Ecological reconstruction of poor agricultural land (Non structural)		2,74								23229,72								planned
23	Monitoring system development of chemical soil pollution in agricultural area (Non structural)		0,676								5731,128								planned
24	Biodiversity recovery of agricultural ecosystem affected by draught (Non structural)		2,928									24823,58							planned
25	Ecological reconstruction at Zlatna (Structural)		2,458								20838,92								planned
26	Protected areas monitoring (Structural)		0,679								5756,562								planned
27	Development of existing forests monitoring ecosystems (Non structural)		0,317								2687,526								planned
28	Fight against soil erosion in Tazlau river basin (Structural)		3,428				29062,58												ongoing
29	Rapid data collection by satelits applied on dangerous hydrometeo phenomena (Non structural)		0,13				1102,14												planned
30	Development of hydrological data base using GIS (Non structural)		0,29		2458,62														planned
31	Development of rapid dissemination of information about flood propagation (Non structural)		0,212				1797,336												ongoing
32	Dams rehabilitation alongside Danube River from Iron Gate km 875 to Isaccea, km 103 (Structural)		2,85				24162,3												ongoing
33	Consolidation and rehabilitation of sliding lands in Zalau city (Structural)		3,2								27129,6								planned
34	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA VALEA CALUGAREASCA (Structural)		2,8								6782,4				16956				planned
TOTAL			**41,357**																
PROJECTS FOR INDUSTRIAL HOT SPOTS																			
35	SELF MONITORING OF BIG INDUSTRIES (Non structural)		1,118								9478,404								planned
36	Modernizing of installations from SC LETEA BACAU SA (Structural)		1,5		12717											PHARE			ongoing
37	WWTP at SC CELOHART DONARIS Braila (Structural)		2,7		22890,6											WB			ongoing
38	Waste water treatment at SC COLOROM CODLEA SA (Structural)		25,3		214493,4														planned
39	WWTP expansion at SC ANTIBIOTICE SA IASI (Structural)		1,8		15260,4														ongoing
40	Works for pollution reduction at UPS GOVORA SA (Structural)		13,6		115300,8														ongoing

41	Modernizing the secondary treatment of WWTP SC SIDERCA CALARASI SA (Structural)		2,5		21195													planned
42	Modernizing WWTP for oil products and sludge recovery at PETROBRAZI PLOIESTI (Structural)		2,8		3815,1										WB			ongoing
43	WWTP at ARPECHIM SA PITESTI (Structural)		13,9		117844,2													ongoing
44	Ecologizing the wet process on the platform TARGU MURES MANPEL SA (Structural)		1,1												WB			ongoing
45	Removal chromium and zinc from the waste water discharged from fabrication of inorganic dyes and phenols from the synthesis of pharmaceutical products at SC SINTEZA ORADEA (Structural)		0,33								2797,74	2797,74						planned
46	Modernizing WWTP CLUJANA SA CLUJ-NAPOCA (Structural)		3											25434				ongoing
47	WWTP system at VIDRA SA ORASTIE (Structural)		1,2		3475,98													planned
48	Action Program for environment protection in petroleum industry (Structural)		100															planned
49	Harmonization of national legislation with six EU regulations regarding risks and industrial pollution control (Non structural)		0,027								228,906							planned
50	Pollution with petroleum products abatement in PLOIESTI zone (pilot project) (Structural)		3								25434							planned
TOTAL			**173,875**															
TOTAL GENERAL			**294,9095**															

Annex 10-1: COMPILATION OF ACTUAL INVESTMENT PORTFOLIO (Million US$)

No	Type/name of Project or Program	Total Capital Requirements		Funding Period	National Funding Sources											International Funding			Remarks
					Equity	Envir. Fund	Water Manag. Fund	Public Loans			Public Grants			Comm. Bank Loans	Others	Organisation	Grant	Loan	
								Central Budget	Reg. Budget	Local Budget	Central Budget	Reg. Budget	Local Budget						
		(MNC)	(MUS$)		(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)		(MUS$)	MUS$)	
1	Harmonization of EU regulation of emmission in water with the national standards (non structural)		0,0250	1998							211,95								ongoing
2	Support for monitoring reference laboratories (non structural)		0,9280								7867,584								ongoing
3	WWTP- Craiova Modernization (Structural)		3,2									27129,6							ongoing
4	Environment territorial laboratories development (Non structural)		0,353								2992,734								ongoing
5	Quality objectives in the activity of water quality (Non structural)		0,284								2407,752								ongoing
6	Expansion of WWTP from Mangalia city (Structural)		5,40					45781,2											ongoing
7	WWTP of Braila Nord (Structural)		21,90					185668,2											ongoing
8	WWTP of Galati city (Structural)		29,50					250101											ongoing
9	WWTP of Zalau city (Structural)		7,00						59346										ongoing
10	Development of WWTP of Resita city (Structural)		3,50									29673							ongoing
11	Development of WWTP of Campulung Muscel city (Structural)		1,50									12717							ongoing
12	Development of WWTP of Deva city (Structural)		5,60									47476,8							ongoing
TOTAL			**79,1900**																
PROJECTS FOR AGRICULTURAL HOT SPOTS																			
13	Afforestation in the Copsa Mica area (Structural)		3,142								26637,88								ongoing
14	Capacity increase of WWTP of COMTOM TOMESTI (Structural)		10		84780														ongoing
15	Fight against soil erosion in Tazlau river basin (Structural)		3,428				29062,58												ongoing
16	Development of rapid dissemination of information about flood propagation (Non structural)		0,212				1797,336												ongoing
17	Dams rehabilitation alongside Danube River from Iron Gate km 875 to Isaccea, km 103 (Structural)		2,85				24162,3												ongoing
TOTAL			**19,632**																
PROJECTS FOR INDUSTRIAL HOT SPOTS																			
18	Modernizing of installations from SC LETEA BACAU SA (Structural)		1,5		12717											PHARE			ongoing
19	WWTP at SC CELOHART DONARIS Braila (Structural)		2,7		22890,6											WB			ongoing

20	WWTP expansion at SC ANTIBIOTICE SA IASI (Structural)		1,8		15260,4														ongoing
21	Works for pollution reduction at UPS GOVORA SA (Structural)		13,6		115300,8														ongoing
22	Modernizing WWTP for oil products and sludge recovery at PETROBRAZI PLOIESTI (Structural)		2,8		3815,1										WB				ongoing
23	WWTP at ARPECHIM SA PITESTI (Structural)		13,9		117844,2														ongoing
24	Ecologizing the wet process on the platform TARGU MURES MANPEL SA (Structural)		1,1												WB				ongoing
25	Modernizing WWTP CLUJANA SA CLUJ-NAPOCA (Structural)		3											25434					ongoing
TOTAL			**40,400**																
TOTAL GENERAL			**139,2220**																

Annex 10-2: COMPILATION OF PLANNED INVESTMENT PORTFOLIO (Million US$)

No	Type/name of Project or Program	Total Capital Requirements		Funding Period	National Funding Sources											International Funding			Remarks
					Equity	Envir. Fund	Water Manag. Fund	Public Loans			Public Grants			Comm. Bank Loans	Others	Organisation	Grant	Loan	
								Central Budget	Reg. Budget	Local Budget	Central Budget	Reg. Budget	Local Budget						
		(MNC)	(MUS$)		(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)	(MNC)		(MUS$)	MUS$)	
1	Control and fight against accidental pollution (Non structural)		0,1								847,8								planned
2	Introduction of new instruments for quality water protection (Non structural)		0,2625								2225,475								planned
3	Guidelines on designing and operation of urban waste land fill (Non structural		0,125								1059,75								planned
TOTAL			**0,4875**																
PROJECTS FOR AGRICULTURAL HOT SPOTS																			
4	Technologies of reclamation of agricultural soils affected by oil and salty water pollution (Non structural)		0,75									6358,5							planned
5	Ecological reconstruction of agricultural soils - Baia Mare (Structural)		1								8478								planned
6	Agricultural turning to good account of zootechnical waste at RONSUIN TEST PERIS (Structural)		1,297								10995,97								planned
7	Recycling and management of available waste from breeding farms (Structural)		2,46								20855,88								planned
8	Ecological reconstruction of poor agricultural land (Non structural)		2,74								23229,72								planned
9	Monitoring system development of chemical soil pollution in agricultural area (Non structural)		0,676								5731,128								planned
10	Biodiversity recovery of agricultural ecosystem affected by draught (Non structural)		2,928									24823,58							planned
11	Ecological reconstruction at Zlatna (Structural)		2,458								20838,92								planned
12	Protected areas monitoring (Structural)		0,679								5756,562								planned
13	Development of existing forests monitoring ecosystems (Non structural)		0,317								2687,526								planned
14	Rapid data collection by satelits applied on dangerous hydrometeo phenomena (Non structural)		0,13				1102,14												planned
15	Development of hydrological data base using GIS (Non structural)		0,29		2458,62														planned
16	Consolidation and rehabilitation of sliding lands in Zalau city (Structural)		3,2								27129,6								planned

17	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA VALEA CALUGAREASCA (Structural)		2,8								6782,4				16956				planned
TOTAL			**21,725**																
PROJECTS FOR INDUSTRIAL HOT SPOTS																			
18	SELF MONITORING OF BIG INDUSTRIES (Non structural)		1,118								9478,404								planned
19	Waste water treatment at SC COLOROM CODLEA SA (Structural)		25,3		214493,4														planned
20	Modernizing the secondary treatment of WWTP SC SIDERCA CALARASI SA (Structural)		2,5		21195														planned
21	Removal chromium and zinc from the waste water discharged from fabrication of inorganic dyes and phenols from the synthesis of pharmaceutical products at SC SINTEZA ORADEA (Structural)		0,33								2797,74	2797,74							planned
22	WWTP system at VIDRA SA ORASTIE (Structural)		1,2		3475,98														planned
23	Action Program for environment protection in petroleum industry (Structural)		100																planned
24	Harmonization of national legislation with six EU regulations regarding risks and industrial pollution control (Non structural)		0,027								228,906								planned
25	Pollution with petroleum products abatement in PLOIESTI zone (pilot project) (Structural)		3								25434								planned
TOTAL			**133,475**																
TOTAL GENERAL			**155,6875**																