

DANUBE POLLUTION REDUCTION PROGRAMME

NATIONAL REVIEWS 1998 MOLDOVA

TECHNICAL REPORTS

Part A: Social and Economic Analysis

Part B: Financing Mechanisms



NATIONAL ACADEMY OF ECOLOGICAL SCIENCES



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: <ul style="list-style-type: none">- 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 **Moldavian National Reviews** were prepared under the supervision of the Country Programme Coordinator, **Mr. Ion Ilie Dediu**. The authors of the respective parts of the report are:

- Part A: Social and Economic Analysis: **Ms. Tatiana Belous**
- Part B: Financing Mechanisms: **Ms. Tatyana Lariusin**
- Part C: Water Quality: **Mr. Dumitru Drumea**
- Part D: Water Environmental Engineering: **Mr. Alexander Yakirevich**

The findings, interpretation and conclusions expressed in this publication are entirely those of the authors and should not be attributed in any manner to the UNDP/GEF and its affiliated organizations.

The National Academy of Ecological Sciences and the Parliament of Moldova

The UNDP/GEF Danube Pollution Reduction Programme,
Danube Programme Coordination Unit (DPCU)
P.O.Box 500, 1400 Vienna – Austria
Tel: +43 1 26060 5610
Fax: +43 1 26060 5837

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Part A

Social and Economic Analysis in Relation to Impact of Water Pollution

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1. Summary

The Prut River is the last major tributary of the Danube, which joins Danube 150 km before its flowing into the Black Sea. The Prut catchment area is shared among three countries - Romania, Ukraine and Moldova. Length of Prut River within Moldova's boundaries constitutes 695 km. The total water availability of Prut River is estimated at 2.9 mln.m³/year. The total available volume of surface water resources in the Moldavian part of the Danube River basin is estimated at 507.2 mln.m³ in a typical year. The exploitable groundwater resources within the boundaries of the Danube catchment area are estimated at approximately 140 mln.m³/year. The total volume of water in aquifers horizons is roughly estimated at 25 times as much. On the territory of the Moldavian part of Danube River basin 2119 artesian wells, 62099 shallow wells and 252 springs are exploited.

Most wetlands have been drained except some areas directly adjacent to the Prut River. Along the Prut River there were originally significant areas of wetlands, but only small ones remain. Limestone quarries and dredging riverbeds for sand are also significant causes of environmental degradation and habitats destruction of river ecosystems. Remaining species in the Moldavian part of the Danube River basin are very limited due to intensive use of land for agricultural needs and drainage of wetlands, and the species number has dramatically declined over last years.

In general, the ecosystems of the Prut River basin are represented by 60 species of fish, out of them 8 species are endangered or threatened to be extinct; by 11 species of amphibian; by 7 species of reptilian, from which 3 species are endangered; 80 species of birds, out of them 15 species are endangered or threatened to be extinct, and by 16 species of mammals, out of them 7 species are endangered or threatened to be extinct.

The main features of environmental degradation in the Moldavian part of the Danube River basin are: water pollution due to transboundary contamination; agricultural run-off, agro-industrial wastewater, industrial discharges, solid waste disposals, wastewater treatment plants, insufficient sewerage in rural area and natural factors; soil erosion and degradation; impact on human health; loss of biodiversity forest degradation and reservoir salutation.

Population of the Danube River basin (Prut River basin, Cahul River basin and Yalpugh River basin) in the Republic of Moldova constitutes 1,096,464 inhabitants (or 25% of the Republic's population), including 306,863 of urban population and 789,601 of rural population (1996). The quota of rural population in the Danube catchment area is 71.6%; the quota of urban population - 28.4%. The total catchment area of the Danube River basin in Moldova is estimated at 12,025 km², what constitutes 35% of the Republic's territory.

According to statistic data, in 1996 per capita income has been estimated at 1779.0 lei, or 378.5 USD.

The average domestic water demand for population living in the Moldavian part of the Danube River basin constitutes 177 l per day per capita; the average daily domestic demand per capita for urban population is 203 l, for rural population - 115 l; the average daily water consumption per capita constitutes 143 l; for urban population - 171 l, for rural population - 109 l. The share of urban population connected to centralized water supply system in the Moldavian part of the Danube River basin constitutes 73.3%, or 225,068 inhabitants out of 306,863. The share of rural population connected to the centralized water supply system constitutes 11.8%, or 99,373 inhabitants out of 789,601.

The total realistic domestic wastewater production constitutes 8.77 mln.m³ (8.46 mln.m³ from urban population and 0.31 mln.m³ from rural population). The average per capita production of domestic wastewater is estimated at 152 l per day; for urban population this amount constitutes 158 l per day, and 75 l per day - for rural population. The share of urban and rural population connected to centralized sewerage system constitutes 47.9% and 1.45% respectively.

It is expected that in 2010 the number of urban population in the Moldavian part of the Danube River basin will increase to 322,000, in 2020 - to 340,000. In the turn, the number of rural population will decrease to 695,000 in 2010 and to 661,000 in 2020. Thus, in 2010 the quota of urban population is expected to be 32%, and the quota of rural population - 68%. In 2020 the quota of urban population will constitute 35%, the quota of rural population - 65%.

It is expected that the share of urban population connected to centralized water system will increase to 85% in 2010 and to 100% in 2020; the share of rural population connected to centralized water supply system will increase to 30% in 2010 and to 50% in 2020. Taking into account the expected introduction of cost covering water prices it appears that in 2010 total domestic water demand will be at the level 36.2 mln.m³; for urban population this amount will constitute 24 mln.m³, for rural population - 12.2 mln.m³; in 2020 total domestic water demand is estimated to be 58.8 mln.m³; for urban population - 34.1 mln.m³, for rural population - 24.7 mln.m³. The average daily domestic water demand for population living in the Moldavian part of the Danube River basin will be 215 l per capita in 2010 and 240 l per capita in 2020. The average daily domestic water demand per capita for urban population is estimated to be at the level

240 l in 2010 and 275 l in 2020; the average daily domestic water demand per capita for rural population will constitute 180 l in 2010 and 205 l in 2020. The daily domestic water consumption will constitute on average 202 l per capita in 2010 and 225 l in 2020. The average daily domestic water consumption for urban population is estimated to be at the level 220 l per capita in 2010 and 250 l in 2020; the average daily domestic consumption for rural population will constitute 175 l per capita in 2010 and 200 l per capita in 2020.

According to water management experts assessment, the share of urban population connected to centralized sewage system will constitute 75% in 2010 and 95 - 100% in 2020; the share of rural population connected to centralized sewerage system will be at the level of 8-10 % in 2010 and 20-25 % in 2020. It appears that in outlined planning horizons 2010 - 2020 the urban population will not use water for watering of private plots, however the share for rural population used water for watering of private plots will reduce to 50% in 2010 compared to 80-90% in 1996 and at least to 30% in 2020. Thus, total domestic wastewater production will be at the level of 19.6 mln.m³ in 2010; for urban population - 17.4 mln.m³, for rural - 2.2 mln.m³. In 2020 the amount of domestic wastewater for urban population will constitute 26.5 mln.m³, for rural population - 8.4 mln.m³. In 2020 the total amount of domestic wastewater is estimated to be at the level of 34.9 mln.m³.

In 1996 from the Danube River system have been abstracted 114 mln.m³ of raw water, what constitutes 6% of total national raw water demand. Among this amount 17 mln.m³ have been abstracted for domestic needs (7% of total national domestic raw water demand); 7 mln.m³ - for industrial needs (0.6% of total industrial raw water demand); 57 mln.m³ - for irrigation purposes (21% of total national raw water demand for irrigation); 22 mln.m³ - for agricultural needs (28% of total national water demand for agricultural needs) and 11 mln.m³ have been abstracted for other needs (6% of total national water demand for other needs).

In 2010 the abstraction of raw water from the Danube River system is estimated to be 207 mln.m³ in 2010 and 285 mln.m³ in 2020. For domestic needs will be abstracted 36 mln.m³ in 2010 and 59 mln.m³ in 2020; for industrial needs 15.5 mln.m³ in 2010 and 21.4 mln.m³ in 2020; for irrigation needs - 75 mln.m³ in 2010 and 85 mln.m³ in 2020; for other needs - 45 mln.m³ in 2010 and 60 mln.m³ in 2020.

In 1996 total wastewater discharge to the Danube River system constituted 36.06 mln.m³. From this amount 8.77 mln.m³ was the municipal discharge; 6.93 mln.m³ - industrial discharge and 20.36 mln.m³ have been discharged by agricultural enterprises. 4.89 mln.m³ (or 13.4%) of these effluents have not been treated at all; the rest part - 31.17 mln.m³ have been treated mechanically and biologically. In general, in Moldova including Prut River catchment area and Danubian lakes catchment area there is no installed advanced treatment facilities.

It is assumed that total wastewater discharge from municipal, industrial and agricultural sectors into the Danube River system will be at the level of 64.1 mln.m³ in 2010, including 19.6 mln.m³ of domestic wastewater discharge, 14.7 mln.m³ of industrial wastewater discharge and 29.8 mln.m³ of agricultural domestic wastewater discharge. In 2020 the total wastewater discharge will constitute 106.2 mln.m³, including 34.9 mln.m³ of domestic wastewater discharge, 20.3 mln.m³ of industrial wastewater discharge and 51 mln.m³ of agricultural wastewater discharge. Also, it is supposed, that proportion of non-treated wastewater will constitute 3% in 2010 and there will not remain non-treated proportion of wastewater in 2020; the proportion of biologically treated wastewater will constitute 87% in 2010 and 75% in 2020; the proportion of advanced treated wastewater will be 10% in 2010 and 25% in 2020.

In spite of the fact that sometimes it is being reported about industrial waste disposals in the districts, in the annual reports on environment state there is no special division of solid waste disposals and industrial (non toxic) ones. Basically, they are collected, stored and treated together. Altogether in the Moldavian part of the Danube River basin there are 22 big and 561 local municipal and industrial solid waste disposals and specialized sites for sanitary treatment of solid waste. Normally big disposal sites are located within 8-10 km of each district center or town-type settlement. Besides, in rural area practically near each village is situated local solid waste disposal. There is information obtained from informal sources that some of these local disposal sites often are situated directly at the banks of small rivers. There exists not a single well-organized hazardous industrial and chemical waste disposal site in the Moldavian part of the Danube River basin. More than 12,000 tons of highly toxic waste is in stock, and a major part of them are pesticide residues.

There is one hydroelectric power plant in the Moldavian part of the Danube River basin on the river Prut - Costesti-Stanca. According to agreement with Romania, it operates on a parity base, i.e. on average one week it produces electricity for Moldova, one week - for Romania. The annual share of Costesti-Stanca hydro power plant electricity production in the total electricity production of Moldova is insignificant; in 1997 this share constituted 6.4% of total national electricity production.

There are no industrial fisheries in the Prut River itself due to its boundary status, however for fish-farming are used Costesti-Stanca reservoir on Prut River (total volume -735 mln.m³, available volume - 450 mln.m³); four Manta lakes in the Prut River corridor, eight Cahul lakes in the lower part of the Prut River basin and numerous reservoirs situated at the small tributaries of the Prut River and in the basin of rivers Yalpugh and Cahul. Altogether in 1996 from the Danube River system have been abstracted 10.98 mln.m³ of raw water for fish-farming; from the Prut River have been abstracted 9.48 mln.m³ in district Cahul; from the Cahul River have been abstracted 1.5 mln.m³ in district Vulcanesti.

Within a long period Prut River is not being used for passenger and freight transportation at the national level because of its status as the state boundary between Moldova and Romania, and the access to Prut River was strictly limited. Currently Prut River is also not used for navigation, except for some local activities linked with sand extraction from riverbed, and there is not any import/export share in total country's trade balance by shipping via Prut River. Besides, Prut River has been never used for recreation purposes at the countrywide and local level. Currently only Costesti-Stanca reservoir is partly used for recreation by people from localities situated close to river, but it mostly refers to so called "wild" tourism.

Currently the building of harbor for oil terminal is being implemented. Its construction is expected to be finished by the year 2000. The harbor will be located at a distance of 50-100 m from the confluence of Prut and Danube Rivers. According to the assessment, a certain impact on ecosystems is expected due to harbor operation. In particular, this impact will cause the destruction of local wetlands and elimination of communities of Benthos organisms at the river bottom

with total surface area about 1000-1300 m². Also, the expected impact includes probable accidental spills and premeditated discharges; muddying of water; bottom siltation; direct destruction of habitats; alteration of water quality and regime of its circulation; banks erosion resulting from change of hydrological regime etc.

The occurrence of such diseases as various intestinal infections, including dysentery, hepatitis A, cholera and others could depend, to a certain extent, on water quality. According to analytical assessment, the extremely polluted sources of centralized drinking water supply cause higher risk for population health in districts Chiadir-Lunga, Ungeni, Leova and Glodeni.

Currently in the Republic of Moldova there is a complex system of environmental legislative and normative acts, governmental decisions and international environmental cooperation approved by the Parliament of Moldova, which in general provide a system of ecological security for people, ecosystems, water, air and land. This system provides also the base and hierarchy for adequate environment management, including use of natural resources and biodiversity conservation; outlines the rights and responsibilities for environment protection of central and local authorities; stipulates the developing of ecological funds intended for financing of different environmental programmes.

To improve the ecological situation and to promote rational use of natural resources, much has been done much within last years in Moldova, however it was and currently remains quite difficult because of transition period, lack of financial resources etc. The current system of environmental management has been created over last few years and it consists of two levels - administrative and economic. At the administrative level the ecological control has been strengthened. In particular, in order to minimize the environmental damage caused by construction and reconstruction of enterprises has been introduced obligatory Environment Impact Assessment. Also, a number of activities related to environment are reviewed, approved and licensed by the government: waste treatment; elaboration of ecological ground in the project documentation; ecological audit; training of environmental specialists; exploitation of underground resources not related to their extraction; exploitation of mineral and water resources; use of natural resources. A number of economic instruments are provided as well: charges for natural resources use (water, soil, flora, fauna); fees for environmental pollution; fines in case of violation of environmental legislation; fiscal discounts in the case of rational use of natural resources, installation of environmental friendly technologies, waste reduction, use of water in closed cycle etc.

2. Description of the State of the Danube Environment

2.1. Water Resources

The Prut River is the last major tributary of the Danube. Total length of Prut River is 967 km; its length within Moldova's boundaries constitutes 695 km. The total water availability of Prut River is estimated at 2.9 mln.m³/year in typical year. The total available volume of surface water resources in the Moldavian part of the Danube River basin is estimated at 507.2 mln.m³ in a typical year, at 255.3 mln.m³ in a rainless year, and at 119.83 mln.m³ in a droughty year. The exploitable groundwater resources within the boundaries of the Danube catchment area are estimated at approximately 140 mln.m³/year (currently only half of these resources are used, i.e. 70 mln.m³/year). The total volume of water in aquifers horizons is roughly estimated at 25 times as much. On the territory of the Moldavian part of Danube River basin 2119 artesian wells, 62099 shallow wells and 252 springs are exploited. Currently used aquifers belonging mostly to upper, middle and lower serration complex and partly to silurian complex are not substantially polluted because of existence of protecting zones. Generally the share of used aquifers does not exceed 50%, which is lower than in other countries. However, overextraction of groundwater has caused significant decrease of water level in some areas; especially large depression in the Moldavian part of the Danube River basin is marked around town Comrat. In spite of the fact that total annual water resources appear adequate, there are local and seasonal difficulties with water supply, especially in the southern part of the Moldavian part of Danube River basin.

Table 2.1. Local water resources in administrative districts in the Moldavian part of the Danube River basin

Districts	Natural water resources			Existing sources of water supply			
	(in dependence on rainfall, mln.m ³)			Total	Springs	Shallow wells	Artesian sources
	50%	75%	95%				
Briceni	49.9	30.8	12.6	10295	-	10178	117
Ocnita	40.7	27.3	16.0	5257	1	5174	82
Edineti	50.2	31.1	16.0	6727	1	6570	156
Riscani	48.0	28.6	14.3	7542	1	7385	156
Glodeni	38.9	22.1	10.4	4599	3	4517	79
Falesti	48.6	27.0	12.5	6974	2	6814	158
Ungeni	45.3	25.2	11.6	3885	7	3771	107
Nisporeni	26.4	14.7	6.8	4376	160	4152	64
Hancesti	35.1	18.4	7.8	3732	10	3562	160
Leova	13.6	6.7	2.5	920	9	831	80
Chimislia	15.0	6.8	2.2	2158	6	2018	134
Cantemir	17.2	7.8	2.6	1836	-	1760	76
Comrat	21.4	9.1	2.6	1935	-	1734	201
Basarabasca	10.2	2.5	0.63	1267	-	1200	67
Ciadir-Lunga	10.9	3.8	1.1	385	3	198	184
Cahul	12.2	5.1	1.4	466	25	365	76
Taraclia	9.5	3.4	1.0	1392	15	1294	83
Vulcanesti	14.1	5.0	1.2	724	9	576	139
Total in the Dun. Basin	497	275.4	123.23	64470	252	62099	2119
Total in RM	1135.0	647.4	308.8	137477	744	131223	5510

On the Prut River 49 water abstraction pump stations with total productivity 53.25 m³/sec have been constructed; out of them 40 pump stations with total productivity 48.19 m³/sec are used for irrigation needs and 9 pump stations with total productivity 5.06 m³/sec - for domestic, industrial and others needs.

In the Moldavian part of the Danube River basin there are 40 main waterbodies with volume greater 1 mln.m³ each. The biggest natural lakes are located in the downstream of Prut River - lake Bogatoe (surface area - 700 ha), lake Belevu (626 ha), lake Dracele (270 ha), lake Rotunda (208 ha) , lake Foltanele (150 ha); all these lakes are connected with river by natural channels.

In general, surface water resources of the Moldavian part of the Danube River basin cover 24% of total water consumption in the Republic (Prut River and its tributaries cover 16%, small rivers Yalpugh and Cahul located in the southern part of Moldova - 8%, groundwater - 30 %, and Dnister River - 46 %).

Table 2.2. River resources in the Moldavian part of the Danube River basin

River	Length	Catchment area (thousand km ²)	Flow volume (km ³)		
			50 %	75 %	95 %
Prut:	695	8240			
			including Romanian part		
near Corpaci			2.12	1.65	1.19
near Ungeni	(376)		2.87	2.29	1.69
near Leova	(216)		2.90	2.38	2.83
Mouth			2.90	2.38	1.83
Yalpugh	142	3180	0.09	0.04	0.02
Cahul	39	650	0.01	0.003	0.001

2.2. Biological Resources and Eco-systems

Generally, aquatic and terrestrial ecosystems along the big rivers vary throughout their courses; at diverse segments of the waterway the systematic and eco-biological components of aquatic population significantly differ, what depends on geo-morphological characteristics of area, types of riparian vegetation, human activity etc. Normally, direct connections among live components of ecosystem are expressed slightly (except direct trophic relations). More often indirect mutual effects of aquatic organisms are observed, and association of two sub-systems (phyto-system and zoo-system) into the integrated ecosystems occurs as a result of mostly indirect regulation.

Morphological structure of natural continental aquatic ecosystems is divided on next levels (or biological horizons): 1) overwater (birds, insects etc.); 2) neistic (running and swimming on the water surface organisms - some species of insects and microphytes); 3) planktonic (phytoplankton and zooplankton); 4) benthic (some species of algae, bottom species of invertebrate); 5) inbottom (crustacean, some species of fish). The ecosystem complex of the Prut River widely varies both in vertical and horizontal directions. Along the Prut River course there is distinct gradient in species richness reaching its maximum in its lower part, especially in floodplain.

In general, the ecosystems of the Prut River basin are represented by 60 species of fish, out of them 8 species are endangered or threatened to be extinct; by 11 species of amphibian; by 7 species of reptilian, from which 3 species are endangered; 80 species of birds, out of them 15 species are endangered or threatened to be extinct, and by 16 species of mammals, out of them 7 species are endangered or threatened to be extinct.

According to the type of vegetation the Prut River basin could be divided into six big sectors: 1) Mamaliga - Lipcani; 2) Lipcani - Costesti; 3) Costesti - Pruteni; 4) Pruteni - Nemteni; 5) Nemteni - Cantemir; 6) Cantemir - Danube. In the first sector natural vegetation is mostly represented by swampy and forestry ones; the main part of this sector is used for agricultural needs. In the next sector Lipcani - Costesti the type of vegetation has been artificially changed because of Costesti-Stanca reservoir building and currently it is mostly represented by wild steppe plants. In the next sector Costest - Pruteni natural vegetation is mostly represented by swampy and leaf-bearing plants. The major part of sector Pruteni - Nemteni is used for agricultural needs; among natural vegetation in this sector the secular oaks occur. In the sector Nemteni - Cantemir the natural vegetation is represented mostly by steppe and forestry plants. The richest vegetation is marked in the sector Cantemir - Danube.

Most wetlands have been drained except for some areas directly adjacent to the Prut River. Along the Prut River there were originally significant areas of wetlands, but only small ones remains. Limestone quarries and dredging riverbed for sand are significant causes of environmental degradation, and in particular, habitats destruction of river ecosystems. Remaining species in the Moldavian part of the Danube River basin are very limited due to intensive use of land for agricultural needs and destruction of wetlands, and species number has been dramatically reduced over last years. The fish population also has reduced due to these activities in addition to riverbanks degradation and water pollution. In 1991 in the valley of Lower Prut has been created State Reserve “Lower Prut” involving area around lake Beleu with total surface area 1691 ha; recently “Lower Prut” had been proposed for enlargement and currently this proposition is approved by the Government. This State Reserve will be the first National Park with total surface area 24,000 ha.

2.3. Human Impact

In general in Moldova 38% of centralized water supply sources do not correspond to human health oriented sanitary-chemical requirements; 16% do not correspond to drinking water quality on nitrates content; 16% - on fluorides; 3% - on chlorides, and 3% - on sulfates.

In 1997 in the Moldavian part of the Danube River basin 66.38% of all underground sources for drinking water supply did not meet sanitary-chemical standards, and 28.37% did not correspond to microbiological requirements. In particular, centralized and decentralized sources of drinking water supply do not correspond to sanitary-chemical standards: in district Briceni - 12% and 46%, in district Ungeni - 61% and 70%, in district Leova - 84% and 79%, in district Cahul - 57% and 85% and in district Vulcanesti - 50% and 100% respectively. The share of contaminated centralized water supply sources on nitrates content constitutes: in Chiadir-Lunga - 14%, in Cantemir - 13.6%, in Taraclia - 11.4%; the share of contaminated centralized water supply sources on fluorides content constitutes: in Chiadir-Lunga - 55%, in Comrat - 21%, in Edineti - 19.3%, in Falesti - 76%, in Glodeni - 71.3 %, in Hancesti - 37.7%, in Nisporeni - 21%, in Riscani - 44.5%, in Ungeni - 15%.

Generally, it is rather difficult to determine a direct connection between population health in districts and quality of drinking water because there is a number of other socio-economic factors and therefore state of human health needs to be considered in the context of both environment quality data and local social, economic and cultural conditions. The previous studies of state of population health in the Moldavian part of the Danube River basin had been shown, in particular, the dependence of mortality rate due to inborn defects on such kinds of water pollution as nitrates and chlorine. Besides, a direct dependence of morbidity rate on iron, sulfate and dry residue pollution of drinking water had been shown (Pre-Investment Study of the Prut River Basin, 1994). In the Environmental Performance Review of Moldova (1997) the dependence of occurrence of such diseases as hepatitis A, dysentery, cholera and other acute intestinal infections on drinking water quality had been described.

There are investigations performed by the Ministry of Health on the effect on human health of drinking water quality from communal and decentralized water supply systems. In particular, it was shown that higher content of nitrates in drinking water may contribute to methaemoglobinemia threatening the small children; higher content of fluorides causes fluorosis; high mineralization - disturbance of metabolism etc. The quality of drinking water affects in general disease rate, and in the first turn, the rate of gastrointestinal diseases. Within last years compared to other districts the average general disease rate has increased in districts Comrat, Vulcanesti and Glodeni. The higher rate of gastrointestinal diseases and cirrhosis is marked in the districts Hancesti, Nisporeni, Leova. The higher disease rate on stomach ulcer in adults is inscribed in districts Riscani, Glodeni, Cimishlia and Hancesti. Among rural population the high level of disablement due to general gastro-pathology is inscribed in the districts Cahul, Chiadir-Lunga, Ungeni, Briceni, Cantemir and Nisporeni. The higher rate of cardiovascular diseases is marked in districts Cahul, Edineti, Briceni, Comrat, Cimishlia, Nisporeni; the rate cerebro-vascular diseases - in districts Comrat, Chimislia, Nisporeni. In 1995 in districts Comrat and Ungeni have been registered 16 and 6 cases of cholera respectively.

2.4. Key Issues of Environmental Degradation

Water Pollution

Generally water of Prut River on the territory of Moldova is of the third to second class quality, i.e. "moderately polluted" to "clean". All small rivers - tributaries of the Prut River - are of the sixth class of pollution, i.e. "very polluted". The running surface waters into the Danubian lakes are extremely polluted. The quality of groundwater used for domestic needs is threatened by high levels of nitrates, pesticides, hydrogen sulfides and fluorides. Most of groundwater wells are shallow, normally 3-12 meters depth; there are also deep wells, but their waters often also contain high levels of fluorides (from 3 to 19 mg/l), especially in the northern part of Moldavian part of the Danube River basin. Half of drinking water from groundwater sources in the Prut River basin has higher nitrates level. In the southern part of Moldavian part of the Danube River basin groundwater is no longer used for irrigation as a result of both poor water quality and high salt content.

Sources of water pollution

There are several causes of water pollution: transboundary contamination; agricultural run-off, agro-industrial wastewater, industrial discharges, solid waste disposals, wastewater treatment plants, insufficient sewerage in rural area and natural factors.

Agricultural run-off. Water resources are greatly impacted by inadequate agricultural practice and agro-chemicals use. River valleys, floodplain and slopes have been cultivated to the edge of the riverbanks within last 20-30 years. As a result, waters are polluted by fertilizers and pesticides residues, although their application has dropped substantially within last few years. Groundwaters mostly are polluted by nitrates.

Agro-industrial wastewater. Water resources are being strongly polluted by animal and poultry farms with organic material and by sugar and wine enterprises with polyphenols.

Solid waste disposals. There are 583 big and local municipal and industrial solid waste disposals and specialized sites for sanitary treatment of solid waste. Also, there is a number of illegal dumps with mixed industrial and municipal waste and a stock of expired and prohibited pesticides in district Vulcanesti, reportedly according to various data from 3000 to 35000 tons.

Wastewater treatment plants. Altogether there are 24 big and 227 local wastewater treatment plants (WWTP) in the Moldavian part of the Danube River basin. Out of local wastewater treatment plants only about 20% operate on the permanent base. Majority of WWTPs is overloaded what strongly affects water quality; normal methods of treatment are mechanical and biological.

Insufficient sewerage system in rural area. Only 50% of urban population and 1.5% of rural population living in the Moldavian part of Danube River basin are connected to centralized sewerage systems what causes a significant pollution of groundwater.

Natural factors. Underground waters especially in the northern part of the Moldavian part of the Danube River basin often contain higher level of fluorides.

Soil Erosion and Degradation

The Prut River basin is predominantly agricultural. The fertile soil supports intensive arable agriculture and cattle breeding. Arable crops include grapes, fruit, nuts, maize, sugar beet and vegetables. Approximately 34% of the soils in Moldova are under severe erosion; the consequence of this erosion is extra turbidity resulting from high concentrations of suspended solids in the Prut River, as well as the decline of humus content in the remaining soil.

Loss of Biodiversity

In the “ Red List” edited in 1978 26 species of vascular plants and 29 species of vertebrate animals have been included. In 1997 the second edition of “Red List” was prepared for edition and now it includes 96 species of vascular plants and 108 species of animals, including 11 species of mammals (out of them 7 inhabit in the Prut River basin); 15 species of birds (all of them inhabit in the Prut River basin), 7 species of reptilian (out of them 3 species inhabit in the Prut River basin).

Forest Degradation

In the Moldavian part of the Danube River basin the forests cover 154,803 ha what constitutes 12% of the total area. It is significantly less than in other European countries, however even this area is not completely covered by forests. In fact, in district Hancesti 22% of territory is covered by forests; at the same time such districts as Taraclia, Comrat and Ciadir-Lunga are very poor in forests (3-7%). Within last years the illegal logging of forests and forestry stripes became a spread phenomena. Forestry resources in the Moldavian part of the Danube River basin are generally of poor and deteriorating quality. Only 25-30% of them currently could be used in the national economy.

Reservoir Salutation

The process of waterbodies siltation is very significant especially because of active soil erosion process. The deposition of sediments is estimated on average at 1-2% of the waterbody volume per year; the total volume of reservoirs and ponds in the Danube catchment area is more than 322 mln.m³. According to assessment made in “Nutrient Balances for Danube Countries”, in the Moldavian part of the Danube River basin total volume of sediments accumulated in waterbodies located in this area could be estimated at 3-6 mln.m³, or 5-10 tons. Additionally, it is reported that in Costesti-Stanca reservoir situated on the Prut River annually 2 mln. tons of sediments are being accumulated.

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

3.1. Present Situation

3.1.1. Population

Population of Moldova constitutes 4.32 mln. inhabitants; the average density of population is about 127.8 people per km². The quota of urban population in Moldova is 46%, or 1,987,200 inhabitants; the quota of rural population is 54%, or 2,332,800 inhabitants. Population of the Danube catchment area (Prut River basin, Cahul River basin and Yalpugh River basin) in the Republic of Moldova constitutes 1,096,464 inhabitants (or 25% of the Republic's population), including 303,863 of urban population and 789,601 of rural population (1996). The quota of rural population in the Danube catchment area is 71.6%; the quota of urban population - 28.4%.

Altogether there are 570 settlements in the Moldavian part of the Danube River basin. Among them the number of settlements with population greater 10,000 persons each is 15; the total number of population in these settlements is 290,000, and their average size constitutes 19,000m². The number of settlements with population of 2000 to 10,000 each is 132; the total number of population in them is 460,000, the average size constitutes about 3500m². The number of settlements with population less 2000 each - 423; the total number of their population constitutes 340,000 and average size is 805 m².

In the Moldavian part of the Danube River basin there are 8 towns (Ungheni, Cahul, Comrat, Chiadir-Lunga, Edineti, Falesti, Leova and Ocnita) and 12 town-type settlements (Nisporeni, Taraclia, Vulcanesti, Briceni, Glodeni, Cantemir, Lipcani, Yargara, Cupcini, Costesti, Vishniovca and Budjac).

Table 3.1. Number and quota of urban and rural population in the Moldavian part of the Danube catchment area

Districts	Total number of population in the districts			Number of population in districts in the Moldavian part of the Danube catchment area		
	total	urban	rural	total	urban	rural
Briceni	82009	17478	64531	82009	17478	64531
Ocnita	61050	19732	41318	37245	19732	17513
Edineti	90341	29091	61250	90341	29091	61250
Riscani	83760	17604	66156	33333	2916	30417
Glodeni	66164	12933	53231	56469	12933	43536
Falesti	96823	18730	78093	72884	18730	54154
Ungeni	119104	41819	77285	99660	41819	57540
Nisporeni	81350	16049	65301	62926	16049	46877
Hancesti	118320	18669	99651	76201	-	76201
Leova	56371	17615	38756	56731	17615	38756
Cantemir	64959	5366	59593	59353	5366	53987
Cahul	88751	42817	45934	88751	42817	45934
Vulcanesti	62916	17800	45116	62916	17800	45116
Chimislia	61177	16540	44637	9836	-	9836
Comrat	73685	25425	48260	73685	25242	48260
Basarabasca	31898	13836	18062	14920	-	14920
Chiadir-Lunga	64065	23596	40469	64065	23596	40469
Taraclia	49983	15679	33304	49983	15679	33304
Total	1352726	370779	981947	1096464	306863	789601
Quota (%)		27.4	72.6		24.8	71.6

In 1996 on average population growth in the Moldavian part of the Danube catchment area constituted 1.09 per 1000. In 8 districts out of 18 ones the population growth was negative (in Ocnita - 7; in Edineti - 3.2; in Briceni - 2.9). The highest population growth is marked in district Chiadir-Lunga - +5.4.

Table 3.2. Population growth in the Moldavian part of the Danube catchment area (1996)

Districts	Population growth (per 1000)
Briceni	- 2.9
Ocnita	- 7.0
Edineti	-3.2
Glodeni	- 1
Riscani	- 1.5
Falesti	2.8
Ungeni	3.9
Nisporeni	3.6
Hancesti	0.7
Leova	1.7
Cahul	2.7
Cantemir	4.5
Vulcanesti	-1.3
Chimislia	2.0
Comrat	2.7
Basarabasca	- 0.2
Chiadir-Lunga	5.4
Taraclia	-0.6
Average	1.09

3.1.2. Area

The territory of the Republic of Moldova is 33,840 km². Moldova is situated in the southeastern part of the Europe. In the west it has a common boundary with Romania, which is being formed by the Prut River. In the north, east, and south it has common boundary with Ukraine. The territory of Moldova from the north to south is 350 km, and from the west to east - 150 km.

The total catchment area of the Prut River basin in Moldova is estimated at 8240 km². Besides, there are two small rivers in the southern part of Moldova - Yalpugh and Cahul, which directly flow into the Danube River via lakes of the same names situated on the territory of Ukraine. The average runoff of Yalpugh River constitutes 91.3 mln.m³ per year and its catchment area is about 3180 km². The average runoff of Cahul River is 9.16 mln.m³; its catchment area constitutes 605 km². Their common average runoff per year is 100.46 mln.m³; the total catchment area of these two rivers is 3785 km². So, the total catchment area of the Danube River basin in Moldova could be estimated at 12025 km², what constitutes 35% of the Republic's territory.

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Taraclia	49983	15679	33304	49983	15679	33304
Total	1352726	370779	981947	1096464	306863	789601
Quota (%)		27.4	72.6		24.8	71.6

sources (pension, temporary migration, trade etc.). Only 2% have regular monthly salary, 3% earn a regular agriculture-bound income and about 15% earn regular income from other sources. A lot of families in rural areas have an additional income from trading of domestic animals, sale of products from private gardens and homemade products, seasonal work outside etc. Unfortunately, there is no realistic statistic data on unemployment rate of urban population in Moldova and respectively in the Moldavian part of the Danube River basin, but generally it is the same throughout the Republic. Along with absolutely unrealistic low figures of 1-2% or some more, sometimes the figure of 20% unemployment rate is being called, however in reality it is significantly higher because even in that case all unemployed people are not considered (often people simply do not apply to employment agencies), and besides, there is a big share of hidden unemployment. Generally, the economic situation in Moldavian part of the Danube basin is characterized by impoverization, lack of livelihood and unemployment.

According to statistic data, total income in Moldova in 1996 constituted 6401.1 mln. lei. Per capita income has been estimated at 1779.0 lei, or 378.5 USD (1 USD= 4.7 lei).

Table 3.4. Main statistic indexes of the population income

Category	1996	
	Lei	US \$
minimum wage (per month)	18	3.8
average nominal wage in Moldova	187.1	39.8
average real wage (per month)	151.8	32.3
average real wage in the Danube catchment area (per month)	149.2	31.7
total income in Moldova (mln.)	6401.4	1361.9
total income in the Danube catchment area (mln.)	1625.4	345.8
per capita income in Moldova	1779.0	378.5
total number of workers in Moldova (thousands)		758.2
Approximate evaluation for the Danube catchment area:		
per capita income	1482.4	315.4
number of workers (thousands)		160.5

In 1996 the average monthly salary constituted 32 USD.

Table 3.5. The average monthly salary in the Moldavian part of the Danube catchment area (1996)

District	Average salary (Lei)	Average salary (USD)
Briceni	148.2	31.54
Ocnita	172.9	36.79
Edineti	174.7	37.17
Glodeni	155.0	32.98
Riscani	148.8	31.66
Falesti	159.7	33.98
Ungeni	152.9	32.53
Nisporeni	124.0	26.38
Hancesti	128.4	27.32
Leova	116.5	24.78
Cahul	156.0	33.19
Cantemir	117.0	24.89
Vulcanesti	124.9	26.57
Chimislia	131.4	27.95
Comrat	157.4	33.49
Basarabasca	212.1	45.13
Chiadir-Lunga	157.2	33.45
Taraclia	162.4	34.55
Average	149.2	31.74

Figure 3.1. Map of the administrative districts of the Moldavian part of the Danube River basin



Keys:

- state boundary
- - - administrative boundary
- towns
- - - Danube catchment area

3.1.4. Domestic Water Demand

According to the water management experts assessment, water losses in the urban water supply system constitute on average about 20%, while in the rural water supply system this amount is on average a range between 5% and 10% of raw water production. These figures have been obtained on the base of analysis of multi-annual data considering the difference between volumes of water abstracted and water used. The experts explain such low indexes of water losses in rural water supply systems by their quite short stretches. Normally they vary from 3-5 km (Ungeni, Leova, Cantemir, Cahul) to 10-20 km (Briceni, Edineti, Glodeni, Nisporeni).

According to multi-annual statistic data, the average domestic water demand for population living in the Moldavian part of the Danube River basin constitutes 177 l per day per capita; the average daily domestic demand per capita for urban population is 203 l, for rural population - 115 l, but this amount widely varies in dependence on district water availability. In fact, in district Edineti this amount constitutes 112-186 l per person, in district Cahul 134-295 l, in district Comrat 69.8-110 l, in district Vulcanesti 68-87 l for urban and rural population respectively. In 1996 in some districts domestic water demand for rural population has dropped compared to 1995 and was 53-62 l per day per capita.

Table 3.6. Domestic water demand for urban and rural population in the Moldavian part of the Danube River basin (1996)

Districts	Total mln.m ³	Urban mln.m ³	Per capita l/day	Rural Mln.m ³	Per capita l/day
Briceni	1.33	1.22	318	0.107	137
Ocnita	1.25	1.16	278	0.086	170
Edineti	1.16	1.07	186	0.090	112
Riscani	0.37	0.12	161	0.250	107
Glodeni	1.25	1.06	284	0.190	97
Falesti	1.02	0.89	162	0.130	114
Ungeni	4.20	3.77	299	0.430	102
Nisporeni	0.58	0.37	86.1	0.210	61
Hancesti	0.05	out of river basin		0.054	57
Leova	1.11	0.92	207	0.190	87
Cantemir	1.19	0.41	278	0.780	162
Cahul	3.77	3.56	295	0.210	134
Vulcanesti	0.49	0.34	87	0.150	68
Chimislia	0.01	out of river basin		0.014	57
Comrat	1.20	1.02	110	0.180	69
Basarabasca	0.69	out of river basin		0.690	62
Chiadir-Lunga	0.25	0.09	118	0.160	75
Taraclia	0.56	0.50	117	0.060	53
Total	20.61	16.68		3.930	
Average			203		115

Multi-annual data show, that on average daily water consumption per capita in the Moldavian part of the Danube River basin constitutes 143 l; for urban population this amount constitutes 171 l, for rural population - 109 l. According to annual water supply statistic report, in 1996 in some districts in the rural area of the Moldavian part of the Danube River basin domestic water consumption has

reduced compared to 1995 and was 49-62 l per day per capita. Also, it is necessary to underline that obtained figures on water consumption per day per capita do not precisely reflect the realistic situation, in the first turn due to poor statistic data on population connected to the centralized water supply system, especially in rural area. Besides, there is an information obtained from informal sources that realistic water consumption per capita in rural area could be significantly less than official figures due to illegal connection of population to centralized water supply system and use of this water for dripping of private plots (especially in the upper parts of villages), and for domestic cattle care.

Table 3.7. Domestic water consumption for urban and rural population in the Moldavian part of the Danube River basin (1996)

Districts	Total mln.m ³	Urban mln.m ³	Per capita l/day	Rural mln.m ³	Per Capita L/day
Briceni	1.110	1.01	265	0.100	129
Ocnita	1.050	0.97	235	0.080	167
Edineti	0.990	0.89	155	0.100	105
Riscani	0.320	0.10	134	0.220	100
Glodeni	0.910	0.88	236	0.180	90
Falesti	0.860	0.74	135	0.120	106
Ungeni	3.540	3.14	217	0.400	95
Nisporeni	0.490	0.31	72	0.180	57
Hancesti	0.054	out of river basin		0.054	54
Leova	0.950	0.77	173	0.180	80
Cantemir	1.070	0.34	230	0.730	152
Cahul	2.170	2.97	245	0.200	127
Vulcanesti	0.420	0.28	72	0.140	62
Chimislia	0.014	out of river basin		0.014	54
Comrat	1.020	0.85	92	0.170	64.
Basarabasca	0.640	out of river basin		0.640	58
Chiadir-Lunga	0.550	0.41	98	0.140	70
Taraclia	0.480	0.42	98	0.060	49
Total	16.640	14.08		3.710	
Average			171		109

The share of urban population connected to centralized water supply system (CW) in the Moldavian part of the Danube River basin constitutes 73.3%, or 225,068 inhabitants out of 306,863; the share of rural population connected to the centralized water supply system constitutes 11.8%, or 99,373 inhabitants out of 789,601.

Table 3.8. Share of urban and rural population connected to centralized water supply (CW) in the Moldavian part of the Danube catchment area (1995)

Towns, Districts	Urban population			Rural population		
	total number	CW Number	share (%)	Total Number	CW Number	share (%)
Briceni	17478	10487	60.0	64531	2125	3.29
Ocnita	19732	11445	58.0	17513	1390	8.00
Edineti	29091	15767	54.2	61250	2205	3.60
Costesti (Riscani)	2916	2041	70.0	30417	5906	19.40
Glodeni	12933	10235	79.1	43536	5529	12.70
Falesti	18730	15000	80.0	54154	3113	5.75
Ungeni	41819	39728	95.0	57840	11568	20.00
Nisporeni	16049	11778	73.4	46877	8587	18.30
Hancesti	out of river basin			76201	2598	3.04
Leova	17615	12183	69.2	38756	6020	15.50
Cantemir	5366	4045	75.4	53987	13170	24.4
Cahul	42817	33119	77.4	45934	4291	9.34
Vulcanesti	17800	10680	60.0	45116	6737	14.93
Chimislia	out of river basin			9836	675	6.68
Comrat	25425	25425	100	48260	7239	14.90
Basarabasca	out of river basin			14920	2820	18.90
Chiadir-Lunga	23596	11384	48.3	40469	6070	15.00
Taraclia	15679	11751	75.0	33304	3330	10.00
Population	306863	225068		789601	93373	
Average			73.3			11.80

3.1.5. Domestic Wastewater Production

In Moldova the production of domestic wastewater could be divided into two categories: 1) theoretical wastewater production and 2) realistic wastewater production. Such situation is due to use of certain quota of water from centralized water supply system for dripping of private plot even in urbanized area, and this quota could widely vary in dependence on agricultural peculiarities of district; its climate conditions; how big is one or another settlement and many other causes. According to our estimation, the quota of water used for dripping of private plots from centralized water supply system in urban area of the Moldavian part of the Danube River basin varies from 10-20% of total water consumption (towns Ungeni, Cantemir, Briceni, Ocnita, Edineti, Riscani, Glodeni, Cahul) to 40-80% (Falesti, Leova, Vulcanesti, Comrat, Chiadir-Lunga, Taraclia). In the rural area the quota of water used from centralized water supply system for dripping of private plots and domestic cattle care is usually a portion between of 80% to 90%, however in some cases it exceeds 90% of total water consumption. Thus, in 1996 the total theoretic domestic wastewater production in the Moldavian part of the Danube River basin constituted 14.87 mln.m³ (11.9 mln.m³ from urban population and 2.97 mln.m³ from rural population). The total realistic domestic wastewater production constituted 8.77 mln. m³ (8.46 mln.m³ from urban population and 0.31 mln.m³ from rural population). Average per capita production of domestic wastewater is estimated at 152 l per day; for urban population this amount constituted 158 l per day and 75 l per day - for rural population.

Table 3.9. Domestic wastewater production for urban population (1996)

Towns	Categories			
	Number of population connected to CSS*	Theoretic wastewater production, mln.m ³	Realistic wastewater production, mln.m ³	Realistic production per capita, l/day
Briceni	8095	0.81	0.65	220.0
Ocnita	9456	0.82	0.61	176.0
Edineti	12698	0.76	0.57	122.0
Costesti (Riscani)	1773	0.08	0.07	108.0
Glodeni	7670	0.75	0.6	214.0
Falesti	2806	0.63	0.13	126.0
Ungeni	37736	2.67	2.4	174.0
Nisporeni	3991	0.26	0.1	68.7
Hancesti		out of river basin		
Leova	6376	0.65	0.39	168.0
Cantemir	3846	0.29	0.26	185.0
Cahul	25787	2.53	2.02	214.0
Vulcanesti	4148	0.24	0.1	66.1
Chimislia		out of river basin		
Comrat	10367	0.72	0.29	76.6
Basarabasca		our of river basin		
Chiadir-Lunga	7327	0.33	0.13	48.6
Taraclia	5025	0.36	0.14	76.3
Total	147030	11.90	8.46	
Average				158.0

* - centralized sewerage system

Table 3.10. Domestic wastewater production for rural population (1996)

Districts	Categories			
	Number of population connected to CSS*	Theoretic wastewater production, mln.m ³	Realistic wastewater production, mln.m ³	Realistic production, per capita, l/day
Briceni	194	0.080	0.008	115
Ocnita	105	0.010	0.005	154
Edineti	190	0.080	0.002	95
Riscani	182	0.180	0.005	90
Glodeni	457	0.150	0.014	82
Falesti	570	0.010	0.002	97
Ungeni	209	0.320	0.007	88
Nisporeni	1305	0.150	0.022	46
Hancesti	795	0.200	0.015	52
Leova	1198	0.140	0.032	74
Cantemir	2063	0.580	0.110	144
Cahul	543	0.180	0.023	116
Vulcanesti	583	0.110	0.011	50
Chimislia	102	0.011	0.002	54
Comrat	537	0.140	0.012	59
Basarabasca	445	0.450	0.009	57
Chiadir-Lunga	544	0.130	0.015	77
Taraclia	902	0.050	0.015	44
Population	11289	2.970	0.31	
Average				75

* - centralized sewerage system

On average, the share of urban and rural population connected to centralized sewerage system constitutes 47.9% and 1.45% respectively.

Table 3.11. Share of urban and rural population connected to centralized sewerage system (CSS) (1995)

Towns, districts	Urban population			Rural population		
	total number	CSS number	share (%)	total number	CSS Number	share (%)
Briceni	17478	8095	46.3	64531	194	0.30
Ocnita	19732	9456	48.0	17513	105	0.60
Edineti	29091	12698	43.6	61250	190	0.31
Riscani	2916	1773	60.8	30417	182	0.60
Glodeni	12933	7670	59.3	43536	457	1.04
Falesti	18730	2806	14.9	54154	570	1.05
Ungeni	41819	37736	90.3	57840	209	0.36
Nisporeni	16049	3991	24.9	46877	1305	2.78
Hancesti	out of river basin			76201	942	1.23
Leova	17615	6376	36.2	38756	1198	3.10
Cantemir	5366	3846	71.7	53987	2063	3.80
Cahul	42817	25787	60.2	45934	543	1.18
Vulcanesti	17800	4148	23.3	45116	583	1.29
Chimislia	out of river basin			9836	102	1.23
Comrat	25425	10367	40.8	48260	537	1.11
Basarabasca	out of river basin			14920	445	3.00
Chiadir-Lunga	23596	7327	31.0	40469	544	1.34
Taraclia	15679	5025	32.1	33304	902	2.71
Population	306863	147030		789601	11436	
Average			47.9			1.45

3.2. Projection for Planning Horizons 2010-2020

From the first half of the 1990s till present Moldova has experienced a severe economic crisis. The fiscal budget is strongly constrained, a lot of enterprises operate under big pressure; disposable income significantly dropped; financial market is underdeveloped and the availability of foreign financing is limited. Generally, economic activity is a subject to a high degree of uncertainty, what in the turn raises the risk of uncertainty for long term projection.

3.2.1. Population

Assuming that: 1) total population number both in Moldova and in the Moldavian part of the Danube River basin will not increase substantially because of present existence of one of the highest population density in the European countries and it will remain at the present level; 2) the birth-rate will be at least 3 times higher than the current rate and will constitute on average 4-6 per 1000; 3) in the nearest future (within 4-5 years) Moldova will overcome economic and social difficulties toward sustainable development, and 4) basic demographo-geographical peculiarities will remain the same (e.g. location of main Republic's towns out of the Danube River basin etc.), one can make prognosis that the number of urban population in the Moldavian part of the Danube

River basin will increase from 307,000 to 322,000 in 2010 and to 340,000 in 2020. In turn, the number of rural population will decrease from 773,000 to 695,000 in 2010 and to 661,000 in 2020. Thus, in 2010 the quota of urban population is expected to be 32%, and rural population - 68%. It is expected also that in 2020 the quota of urban population will constitute 35%; the quota of rural population - 65%.

Table 3.12. The projection of population number

Years	1998		2010		2020	
Categories	Urban	rural	urban	rural	urban	rural
number	307000	773000	322000	695000	340000	661000
total number	1080000		1017000		1001000	

3.2.2. Domestic Water Demand

Taking into account the expected introducing of cost covering water prices it appears that average daily domestic water demand for population living in the Moldavian part of the Danube River basin will be 215 l per capita in 2010 and 240 l per capita in 2020. The average daily domestic water demand per capita for urban population is estimated to be at the level 240 l in 2010 and 275 l in 2020. The average daily domestic water demand per capita for rural population will constitute 180 l in 2010 and 205 l in 2020. It is expected that in 2010 total domestic water demand will be at the level 36.2 mln m³; for urban population this amount will constitute 24 mln.m³, for rural population - 12.2 mln.m³. In 2020 total domestic water demand is estimated to be 58.8 mln.m³; for urban population - 34.1 mln.m³, for rural population - 24.7 mln.m³.

It is expected that the share of urban population connected to centralized water system will increase to 85% in 2010 and to 100% in 2020; the share of rural population connected to centralized water supply system will increase to 30% in 2010 and to 50% in 2020. Due to expected extending of centralized water supply system and reducing of water losses through improving of water supply system the daily domestic water consumption will constitute on average 202 l per capita in 2010 and 225 l in 2020. The average daily domestic water consumption for urban population is estimated to be at the level 220 l per capita in 2010 and 250 l in 2020; the average daily domestic consumption for rural population will constitute 175 l per capita in 2010 and 200 l per capita in 2020.

Table 3.13. Projection of domestic water demand

Years	2010		2020	
Categories	urban	rural	urban	rural
per capita demand (l/day)	240	180	275	205
per capita consumption (l/day)	220	175	250	200
number of population connected to centralized water supply system	274000	188000	340000	330000
share of popul. with CWSS (%)	85	30	100	50
separate demand (mln.m ³)	24.0	12.2	34.1	24.7
total demand (mln.m ³)	36.2		58.8	

3.2.3. Domestic Wastewater Production

According to water management experts prognosis, the share of urban population connected to centralized sewage system will constitute 75% in 2010 and 95-100% in 2020; the share of rural population connected to centralized sewerage system will be

8-10% in 2010 and 20-25% in 2020. It appears that in outlined planning horizons 2010-2020 the urban population will not use water for dripping of private plots, however the share for rural population using water for dripping of private plots will reduce to 50% in 2010 compared to 80-90% in 1996 and at least to 30% in 2020. Thus, total domestic wastewater production will be at the level of 19.6 mln.m³ in 2010; for urban population - 17.4 mln.m³, for rural - 2.2 mln.m³. In 2020 the amount of domestic wastewater for urban population will constitute 26.5 mln.m³, for rural population - 8.4 mln.m³. In 2020 the total amount of domestic wastewater is estimated to be at the level of 34.9 mln.m³.

Table 3.14. Projection of domestic wastewater production

Categories	2010		2020	
	urban	rural	urban	rural
per capita (l per day)	198	87.5	225	140
number of population connected to CSS*	241000	69500	323000	165000
Share of popul with CSS (%)	75	10	95	25
separate production (mln.m ³)	17.4	2.2	26.5	8.4
total production (mln.m ³)	19.6		34.9	

* - centralized sewerage system

4. Actual and Future Population Potentially Affected by Water Pollution

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

The Prut River mostly is affected by pollution from agricultural runoff and cattle-breeding farms from Moldova; poorly treated industrial discharge from Ukraine and industrial, agro-industrial and municipal wastewater discharge from Romania.

Currently there are 12 sampling stations on Prut River where regularly surface water quality is monitored on 30 hydrochemical and 5 biological parameters by the Ministry for Environment Protection through Hydrometeo Service.

Table 4.1. Sampling stations on the Prut River and length of stretches

No. of sampling stations* and stretches	Location of sampling station	Stretches	Length (km)
1	Sireuti	Criva - Sireuti	25
2	Corpaci	Sireuti - Corpaci	79
3	Costesti	Corpaci - Costesti	45
4	Braniste	Costesti - Braniste	10
5	Sculeni	Braniste - Sculeni	133
6	Ungeni	Sculeni- Ungeni	19
7	Valea Mare	Ungeni- Valea Mare	23
8	Leuseni	Valea Mare- Leuseni	61
9	Leova	Leuseni- Leova	76
10	Stoianovca	Leova- Stoianovca	64
11	Cahul	Stoianovca-Cahul	74
12	Branza	Cahul - Branza	33
13	Giurgiulesti	Branza - Giurgiulesti	44

* - Location of sampling stations is indicated on Fig.4-1

Quality control of drinking water on main sanitary-chemical and microbiological indexes is realized by Sanitary-Epidemiological Service of the Ministry of Health in the sites of water abstraction before its intake; after treatment of raw water its quality is assessed by the special service of the Ministry of Municipal Service and Housing and by the Ministry of Health. The assessment of water quality is carried out on the base of maximum admissible concentrations for each pollutant. There are two kinds of maximum admissible concentrations - for pollutants in waterbodies which are used for domestic water supply (human health oriented), and maximum admissible concentrations for pollutants in waterbodies which are used for fish farming (ecologically oriented). Altogether there are 9 water pumping plants on the Prut River for centralized domestic water supply with total productivity 5.06 m³/sec (districts Briceni, Edineti, Glodeni, Ungeni, Nisporeni, Leova, Cantemir and Cahul). Raw water abstracted from river is undergone to mechanical and physico-chemical treatment, but these activities mostly refer to the lighting and disinfecting of water. In general, in the sites of location of pump stations for abstraction of raw water for domestic needs from the Prut River the quality of water mostly meets standards for surface water used for centralized water supply (GOST 2761-84). Some indexes of quality of surface water used as a source for centralized water supply as well as some national and international standards of drinking water quality are presented below.

Figure 4.1. Map of the sampling stations allocation in the Moldavian part of the Danube river basin



Keys:

- .- state boundary
- - - Danube catchment area
- ◀ sampling stations

Table 4.2. Indexes of surface water quality used for centralized water supply (GOST 2761-84)

	Indexes of surface water quality		
	I class	II class	III class
dry residue, mg/l	< 1000	1000	1500
chlorides, mg/l	< 350	350	350
sulfates, mg/l	<500	500	500
hardness, mol/m ³	<7	7	10
turbidity, mg/l	20	1500	10000
color, degree	<35	<120	<200
odor, force	<2	<3	<5
PH	6.5-8.5	6.5-8.5	6.5-8.5
iron, mg/l	<1	<3	<5
manganese, mg/l	<0.1	<1.0	<2.0
phytoplankton, cells/sm ³	1000	100000	100000
COD, mgO ₂ /l	<7	<15	<20
BOD (total), mgO ₂ /l	<3	<5	<7
number of coli bacteria/ l	1000	10000	50000
pathogenic microorganisms	inadmis	inadmis	inadmis

According to standard, concentrations of chemicals in surface water used as a source for centralized water supply should not exceed maximum admissible concentrations for drinking water.

Table 4.3. Some national and international standards of drinking water quality

Parameters	Units	National standards	EU standards		USA standards	
			recommend*	MAC**	recommend.	MAC
turbidity	mg/dm ³	1.500	0.400	4	1	5
color	Degree	20	5	20	15	-
pH	-	6.5-8.5	6.8-8.5	9.50	6.8-9.5	-
hardness	mg/equiv.	7	7	-	-	-
sulfates	mg/dm ³	500	25	250	250	-
N (NO ₃)	mg/dm ³	10	6	11	-	10
N (NH ₄)	mg/dm ³	2	2	-	-	-
dry residue	mg/dm ³	1000	-	1500	500	-
copper	mg/dm ³	0.300	0.050	0.20	0.300	-
manganese	mg/dm ³	0.100	0.020	0.05	0.050	-
phenols	mg/dm ³	0.001	0.001	-	0.001	-
detergents	mg/dm ³	0.500	-	0.20	0.300	0.5
microorganisms	Number/sm ³	100	-	-	-	-
coli-index	Number/dm ³	3	-	1	-	1

* - recommended concentrations

** - maximum admissible concentrations

According to classification scheme of water quality based on the Index of Water Pollution, which represents an integrated parameter of ammonia, nitrates, nitrites, phenols, BOD and oil products content, water of the Prut River on the territory of Moldova is of the third to second class quality, i.e. “moderately polluted” to “clean”. In the site of confluence with Danube the water of Prut River is of the fifth class of quality, i.e. "polluted", while in Valea Mare locality (after confluence with Jijia River) it is of the sixth class of quality, i.e. "very polluted".

In the Prut River the higher content of organic substances are detected, what causes the increasing of COD index and means the small quantity of dissolved oxygen in the water. The most polluted river sectors are situated near Ungeni and Valea Mare localities, after discharge of Jijia River into Prut from the territory of Romania where higher concentrations of nitrites, ammonia and phosphorus compounds are detected. Besides, systematically the indexes of BOD in many river's segments exceed national and EU standards for drinking water quality.

Table 4.4. Number of population living in communities directly located at the Prut River stretches exceeding standards for drinking water quality

Localities	Number of population	Number of projected population
Criva	1855	1800
Drepcauti	1600	1500
Lipcani	7300	8000
Sireuti	1170	1100
Pererata	2080	2100
Lopatnic	1460	1400
Bogdanesti	1600	1550
Viiosoara	1625	1570
Badraj Noi	1300	1400
Badraj Veci	930	900
Corpaci	1460	1400
Cuconesti Veci	1200	1100
Costesti	2916	2900
Ungeni	40400	42000
Valea Mare	1530	1500
Costuleni	3560	3500
Macaresti	2560	2500
Grozesti	2350	2300
Balaresti	1200	1100
Zberoia	1700	1650
Nemteni	1300	1320
Cotul Mare	1730	1700
Poganesti	1410	1400
Leova	12185	13500
Ganeseni Noi	1170	1070
Cantemir	36602	37000
Stoianovca	1590	1500
Cahul	42900	43500
Total	175123	181760

Generally, after treatment the quality of water abstracted from the Prut River mostly meets standards for drinking water (GOST 2874-82) in terms of mineralization, dissolved oxygen, sulfates, pH, chlorine, N-nitrates, N-nitrites, iron and some other indexes. At the same time, regularly the exceeding of maximum admissible concentrations of some pollutants over drinking water quality standards are registered. In fact, within last years the exceeding of concentration over adopted standards have been registered for suspended solids (250 times), oil products (1.2 times), organochlorine pesticides (1.2-1.3 times), phenols (2-4 times), detergents (2 times). In this connection water supply authorities think that on the pump stations should be installed extra facilities at least for purification of surface water from phenols and detergents.

Besides, the surface water in reservoirs situated in the northern part of Prut River basin does not meet drinking water quality standards for sodium (1.5-3.0 times as much) and pesticides residues; in reservoirs located in the central part - for sulfates (1.2-1.5 times) and sodium (5.0-10.0 times); in reservoirs located in the southern part of Prut River basin - for chlorine (1.5 times), sulfates (1.8-3.0) and mineralization (3-4 times).

The monitoring of water quality performed by the Ministry of Health indicates in upper part of Prut River (sampling stations Sireuti, Corpaci) and also in Costesti-Stanca reservoir higher concentrations of oil products, phenols and cadmium. Such kind of pollution comes from Ukrainian town Cernauti, where several munitions enterprise and a timber plant are located. After confluence of Jijia River with Prut River higher content of phenols, N-ammonia, oil products and other pollutants are registered. This contamination results from poorly treated wastewater discharge from construction materials, machinery construction and oil-chemical enterprises, and also from big cattle-breeding farm located in town Jasi, Romania.

Table 4.5. Some indexes of Prut River water quality not corresponding to the national standards for drinking water quality at the Prut River stretches (1997)

Determands, mg/ l	Indexes of water quality						
	No. of stretches *						
	1	2,3,4	5,6	7	8,9	10,11	12,13
suspended solids	129	65	233	120	122	630	200
oil products	0.120	0.120	0.130	0.110	0.130	0.120	-
phenols	0.002	-	0.006	0.004	0.006	0.006	0.006
HCCH - a, b, c, d	-	0.006	0.020	0.007	0.005	0.006	0.007
N-ammonia	-	-	5	5	4	4	2
detergents	-	-	0.020	0.020	0.040	0.003	0.030

* - No. of stretches are indicated in Tab.4-1

In general, in Moldova substantial proportion of drinking water supply systems does not correspond to hygienic standards. On average, 38% of centralized water supply sources do not meet sanitary-chemical requirements (16% do not correspond to drinking water quality on nitrates content; 16% - on fluorides; 3% - on chlorides, 3% - on sulfates) and 11% of centralized water supply sources do not correspond to microbiological standards. Among decentralized water supply sources 70% do not meet sanitary-chemical standards, and 12% - microbiological ones. The share of drinking water samples not meeting the sanitary-chemical standards is 2 times as higher in the decentralized sources than in communal. About 20% of drinking water supplies contain fecal coliforms, what is a major factor in the increasing of hepatitis A incidence. Also, monitoring indicates that about 70% of samples from natural springs and fountains contain higher concentrations of nitrates and ammonia, and 25% of all samples exceed microbiological standards.

In 1997 in the Moldavian part of the Danube River basin 66.38% of all underground sources for drinking water supply did not meet sanitary-chemical standards and 28.37% - did not correspond to microbiological requirements. In particular, communal and decentralized sources of drinking water supply do not correspond to sanitary-chemical standards: in district Briceni - 12% and 46%, in district Ungeni - 61% and 70%, in district Leova - 84% and 79%, in district Cahul - 57% and 85% and in district Vulcanesti - 50% and 100% respectively. The share of contaminated centralized water supply sources on nitrates content constitutes: in Chiadir-Lunga - 14%, in Cantemir - 13.6%, in Taraclia - 11.4%; the share of contaminated centralized water supply sources on fluorides content constitutes: in Chiadir-Lunga - 55%, in Comrat - 21%, in Edineti - 19.3%, in Falesti - 76%, in Glodeni - 71.3 %, in Hancesti - 37.7%, in Nisporeni - 21%, in Riscani - 44.5%, in Ungeni - 15%.

Due to lack of other proper rivers a big share of population in the Moldavian part of the Danube River basin relies on underground water. On average, the proportion of underground water used for drinking purposes constitutes 80-85%. In general, in the Prut River basin the quality of underground water is poor; these waters are in majority alkaline, with higher content of hydrocarbons, sodium and fluorides. In fact, in districts Falesti, Nisporeni and Ungeni groundwater contains fluoride in concentration of 5-12 mg/l. Besides, rural population mostly uses for drinking purposes water from shallow wells strongly polluted with compounds of nitrogen.

Table 4.6. Population at health risk due to chemical contamination of drinking water

Districts	Localities	Total number of potentially affected population
Chiadir-Lunga	Valea Pergei, Joltei, Besh-Gaidar, Baurchi, Circuitnea	22800
Ungeni	Elisavetovca, Glodeni, Uncesti, Cheteteni, Parlita, Bushila, Chriuleni, Bumbata, Cornesti, Sinesti, Bogenii Noi, Condratesti, Tudoresti	29786
Leova	Bauish, Sarma, Tocile-Raducanu, Tomai, Covarlui, Sarata Noua, Tigeni, Yargora	18850
Glodeni	Bolotino, Tomestii Veci, Clocochenii Noi, Cuhnesti, Clocochenii Veci, Cobani, Camenka, Cajba, Chuchuilea, Viisoara	19700

Water supply authorities have ranked the districts in the Moldavian part of the Danube River basin, which needed urgent improving of drinking water quality: Briceni, Chiadir-Lunga, Chimislia, Hancesti, Riscani, Nisporeni, Cantemir, Comrat, Ocnita, Edineti, Basarabasca and Taraclia.

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

Regarding bacteriological contamination the quality of Prut River does not correspond to hygienic standards after confluence with its tributaries - Racoveti, Chugur, Camenca, Larga and others (these tributaries as well as Yalpugh River and Cahul River belonging to the Danube River catchment area are not monitored due to lack of financial means); in the downstream from big settlements; cattle-breeding farms located along the Prut River; local wastewater treatment plants etc. According to monitoring data of the Ministry of Health, microbiological contamination is

observed almost along all course of the Prut River in the Moldova’s boundary. In fact, in district Briceni situated in the upper part of the river basin microbiological contamination of Prut River constitutes 19.3%, while after discharge of Jijia River from Romanian side (middle part) enormous bacteriological pollution is marked: in district Ungeni - 83.3% of all samples, in districts Leova, Cahul and Vulcanesti - 100%; the number of coli bacteria in samples constitutes 240,000 per liter, what is 48 higher than hygienic standard.

Table 4.7. National standards of bathing water quality

Determands	Standards
odor, force	2
PH	6.5-8.5
dry residue, mg/l	1000.0
dissolved oxygen, mg/l	4.0
iron, mg/l	1.0
manganese, mg/l	0.1
phytoplankton	-
COD, mgO ₂ /l	30.0
BOD, mgO ₂ /l	6.0
pathogenic microorganisms	inadmissible
number of coli bacteria / l	5000
number of enterococcus/ l	absence
chemicals	not higher MAC*

* *maximum admissible concentration*

Because of its status of the state boundary, Prut River is not officially allowed for bathing, sport and recreation; currently only Costesti-Stanca reservoir situated on the river is partly used for recreation. However, in some or another degree people living close to river have a contact with water from this river, and therefore there is a probability for adverse effect of poor water quality on human health.

Table 4.8. Number of population living in communities directly located at the Prut River stretches exceeding standards for bathing water quality

Localities	Number of population	Number of projected population
Ungeni	40400	42000
Valea Mare	1530	1500
Costuleni	3560	3500
Macaresti	2560	2500
Grozesti	2350	2300
Balauresti	1200	1100
Zberoia	1700	1650
Nemteni	1300	1320
Cotul Mare	1730	1700
Poganesti	1410	1400
Leova	12185	13500
Ganeseni Noi	1170	1070
Stoianovca	1590	1500
Cahul	42900	43500
Valea-lui-Isac	3000	3100
Colibash	1700	1650
Valeni	3350	3400
Branza	2500	2600
Clobodzea Mare	5900	6200
Cashlita-Prut	1360	1350
Giurgiulesti	2900	3000
Total	136295	139840

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

Generally, it is rather difficult to determine a direct connection between state of population health in the districts and quality of drinking water because there is a number of other socio-economic factors, and therefore state of human health needs to be considered in the context of both environment quality data and local social, economic and cultural conditions.

In the previous studies of the state of population health in the Moldavian part of the Danube River basin (Pre-Investment Study of the Prut River Basin, 1994) a dependence of mortality rate due to inborn defects on water polluted by nitrates and chlorine has been shown. Besides, a direct dependence of morbidity rate on iron, sulfate and dry residue pollution of drinking water had been revealed in the special investigations performed by Sanitary-Epidemiological Service of the Ministry of Health.

Currently there is no available data on effects of drinking water quality on population health from very surface sources of water supply, however there are some investigation on effect on human health of quality of drinking water from centralized and decentralized water supply sources. In particular, it was shown that higher content of nitrates (up to 45 mg/l) in drinking water causes methaemo-globinemia threatening small children; high content of fluorides causes fluorosis; higher mineralization -disturbance of metabolism and uro-genital diseases, higher hardness - kidney diseases etc. Besides, it was shown, that occurrence of such diseases as various acute intestinal infections, including dysentery, cholera etc., and also hepatitis A could depend, to a certain extent, on drinking water quality (Environmental Performance Review of Moldova, 1997).

Microbiological contamination is reflected by outbreaks of water-borne diseases, and they are manifested by symptoms of acute intestinal infection. According to assessment of the Ministry of Health, 20% of all acute intestinal diseases could be attributed to contamination of drinking water. In the first turn, the quality of drinking water affects general disease rate, and in particular, the rate of gastrointestinal diseases. Within last years compared to other districts the average general rate of diseases inscribed in districts Comrat, Vulcanesti and Glodeni. The higher rate of gastrointestinal diseases and cirrhosis is marked in districts Hancesti, Nisporeni and Leova. The higher rate of stomach ulcer diseases in adults is inscribed in districts Riscani, Glodeni, Chimislia and Hancesti. Among rural population a high level of disablement due to gastro-pathology is inscribed in the districts Cahul, Chiadir-Lunga, Ungheni, Briceni, Cantemir and Nisporeni. The higher rate of cardiovascular diseases is marked in districts Cahul, Edineti, Briceni, Comrat, Chimislia, Nisporeni; the higher rate of cerebro-vascular diseases - in districts Comrat, Chimislia and Nisporeni.

According to analytical assessment, the extremely polluted sources for centralized drinking water supply cause higher risk for population health in districts Chiadir-Lunga, Ungheni, Leova, Glodeni.

In the Moldavian part of the Danube River basin the average infant mortality rate is 17 per 1000. The highest rate - 38 is observed in district Cahul; the lowest one - 10 is marked in district Vulcanesti. The average mortality rate due to infectious diseases of adult population is 15 per 100000; the highest rate - 24 is observed in district Taraclia, the lowest one - 7 in district Chiadir-Lunga. The average mortality rate due to diseases of digestive system including cirrhosis is 131 per 100000; the highest rate -229 is marked in district Nisporeni, the lowest one - 91 in district Edineti.

Table 4.9. Indexes of mortality rate of population in the Moldavian part of the Danube River basin (1994)

Districts	Mortality rate due to various diseases			
	Number of children at age under 1 year (per 1000)	Infectious and parasitic (per 100000)	Digestive system (per 100000)	
				includ. cirrhosis
Briceni	16.2	20.7	101.2	75.6
Ocnita	13.8	17.8	109.2	89.4
Edineti	12.7	14.5	91.4	72.9
Riscani	22.3	9.60	97.4	82.8
Glodeni	29.8	16.8	99.1	79.0
Falesti	20.2	13.7	116.3	95.4
Ungeni	12.8	15.9	111.3	94.3
Nisporeni	26.6	11.2	229.3	200.1
Hancesti	24.3	17.8	158	136.0
Leova	26.6	23.1	148.3	120.2
Cantemir	31.6	9.8	179.6	155.1
Cahul	39.7	17.0	117.8	77.1
Vulcanesti	10.1	20.8	158.7	133.3
Chimislia	16.0	11.4	113.5	79.5
Comrat	25.0	16.8	135.9	109.2
Basarabasca	16.7	9.2	149.3	124.0
Ch.-Lunga	22.5	7.2	143.3	118.8
Taraclia	35.0	23.9	100.2	74.3

On average, the general disease rate in the Moldavian part of the Danube River basin constitutes 223 per 100000; the highest rate - 500 has been detected in district Comrat; the lowest one - 85 in district Edineti.

Table 4.10. Indexes of general disease rate of population in the Moldavian part of the Danube River basin (1994)

Districts	Disease rate (per 100000)		
	general	including:	
		gastric ulcer	hepatitis A and cirrhosis
Briceni	378.2	14.4	11.9
Ocnita	92.7	7.8	10.7
Edineti	85.1	10.8	12.7
Riscani	187.3	17.6	13.2
Glodeni	220.3	13.2	24.4
Falesti	213.6	11.1	19.2
Ungheni	107.3	7.2	9.2
Nisporeni	262.9	22.3	33.1
Hancesti	249.5	17.6	25.3
Leova	263.8	77.4	7.3
Cantemir	182.3	9.6	25.4
Cahul	190.0	15.0	15.3
Vulcanesti	150.0	13.8	13.5
Chimislia	267.4	20.3	15.4
Comrat	500.2	18.3	42.3
Basarabasca	145.9	10.2	18.4
Ch.-Lunga	264.8	11.3	43.9
Taraclia	253.6	25.3	20.8

On average, the morbidity rate due to hepatitis A constitutes 252 per 10,000; the highest rate 394 was marked in district Golden, the lowest one - 27 in district Comrat. The average rate of morbidity due to dysentery is 42 per 100,000; the highest rate 102 is detected in district Glodeni; the lowest one - 9 in district Briceni.

Table 4.11. Indexes of morbidity rate of population due to some diseases in the Moldavian part of the Danube River basin (1995)

Districts	Disease rate due to					
	hepatitis A		dysentery		enteritis	
	No. of cases	per 100,000	No. of cases	per 100,000	no. of cases	per 100,000
Briceni	176	215.55	7	8.6	50	61.23
Ocnita	181	296.96	35	57.4	101	165.70
Edineti	117	130.58	41	45.8	88	98.21
Riscani	189	226.34	27	32.3	68	81.43
Glodeni	259	393.61	67	101.8	90	136.77
Falesti	178	235.60	32	33.4	145	151.43
Ungheni	163	212.10	37	48.2	107	139.23
Nisporeni	255	316.96	50	62.2	40	49.72
Hancesti	433	367.72	23	19.5	49	41.61
Leova	141	271.41	24	46.2	33	63.52
Cantemir	172	281.27	41	67.0	116	189.69
Cahul	106	248.20	25	56.2	39	87.64
Vulcanesti	189	303.61	19	30.5	77	123.69
Chimislia	99	160.84	48	78.0	85	138.09
Comrat	19	26.66	15	21.1	71	99.64
Basarabasca	93	215.52	24	56.2	37	85.74
Ch.-Lunga	252	365.21	38	55.0	22	31.88
Taraclia	124	270.44	14	30.5	104	226.82

Besides, in 1995 in districts Comrat and Ungeni 16 and 6 incidences of cholera have been registered respectively.

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

5.1. Actual Situation

In 1996 total abstraction of water in Moldova was 1891 mln.m³. Total water use is estimated at 1766 mln.m³. This amount was shared by the next way: 1128 mln.m³ (including 35 mln.m³ of drinking water) have been used for industrial needs; 274 mln.m³ - for irrigation; 80 mln.m³ - for agricultural water supply; 239 mln.m³ - for domestic needs. Irreversible consumption and transportation of wastes constituted 99 mln. m³; the volume of reused water constituted 501 mln.m³. About 226 mln.m³ of water have been abstracted from underground sources; 114 mln m³ have been abstracted from Danube River system (Prut and its tributaries - Yalpugh and Cahul) and the remaining part of 1652 mln m³ was abstracted predominantly from Dnister River.

5.1.1. Abstraction of Raw Water from the Danube River System

Surface and groundwater resources in the Moldavian part of the Danube River basin are used for drinking and domestic water supplies, industry, irrigation, other agricultural purposes, and some activities, including fish-farming. Normally for domestic water supply of towns and town-type settlements water is abstracted from river and artesian wells; for localities in the rural areas - from shallow groundwater wells.

Altogether in 1996 from the Danube River system (river Prut and its tributaries, Yalpugh River and Cahul River) 114 mln.m³ of raw water have been abstracted, including 34 mln.m³ of underground water. Among this quantity 88 mln.m³, including 24 mln.m³ of underground water was abstracted from Prut River and its tributaries; 18 mln.m³, including 9 mln.m³ of underground water from Yalpugh River, and 8 mln.m³, including 1 mln.m³ of underground water from Cahul River. At the same time in 1995 from the Danube River system 182 mln.m³ of raw water have been abstracted, including 38 mln.m³ of underground water. Out of this amount 150 mln.m³, including 27 mln.m³ of underground water have been abstracted from the Prut River system; 23 mln.m³, including 10 mln.m³ of underground water from Yalpugh River, and 9 mln.m³, including 1 mln.m³ of underground water from Cahul River. In 1996 the abstraction of raw water from the Danube River system has dropped in 1.55 times, or for 34% compared to the year 1995; the most evident reduction is marked in the Prut River system mostly due to reducing of water use for irrigation. Taking into account current economic situation, it appears that in 1997 abstraction of water was at the same level, or slightly decreased due to reduction of raw water use for irrigation and partly for other agricultural needs and industry.

Table 5.1. Annual abstraction of raw water from the Danube River system

Years	1995		1996	
	total mln.m ³	including underground	total mln.m ³	including underground
Prut River system	150	27	88	24
Yalpugh River system	23	10	18	9
Cahul River system	9	1	8	1
Total for Danube basin	182	38	114	34
Total for Moldova	2005	244	1891	226
Proportion for the Danube River basin	9%	16%	5.8%	15%

Table 5.2. Raw water abstraction from the Danube River system for various needs (1996)

Categories	In Moldova	In the Danube River system	Proportion (%)
Total abstraction (mln.m ³) including:	1891	114	6
domestic need	239	17	7
industrial needs	1128	7	0.62
irrigation needs	274	57	21
agricultural needs	80	22	27.5
other needs	170	11	6.4

Table 5.3. General indexes use of water abstracted from the Danube River system

River basins	Prut		Jalpugh		Cahul		in RM	in the Danube basin
	1995	1996	1995	1996	1995	1996	1995	%
Total abstraction, (mln.m ³)	150	88	23	18	9	8	2005	9.1
Use of water for various purposes, including (mln.m ³):								
domestic needs	15	15	2	2	-	-	239	7.1
industrial needs	7	7	1	1	-	-	1093	0.7
irrigation needs	85	42	11	9	7	5	402	26
agricultural needs	19	16	7	5	1	1	87	31
other needs	12	8	1	-	-	2	52	25
Total discharge								
including from other needs (mln.m ³)	62	43	3	2	-	-	1396	4.7
out of them:								
non-treated	2	2	1	1	-	-	12	25
clean	47	33	-	-	-	-	1134	4.1
purified	13	6	1	1	-	-	238	5.9

5.1.1.1. Domestic Raw Water Demand

Unlike the volume of water consumption, in the annual statistic report the volume of raw water demand is considered in total for various needs, and there is no division on by certain uses. The proportion of total water use and total water demand could widely vary from year to year. In fact, in 1996 from the Prut River system for various needs 150 mln.m³ of raw water have been abstracted, however only 138 mln.m³ of water has been used. Thus, total water losses could be estimated on average at 8%.

According to statistic data, altogether in 1996 in Moldova for domestic needs 239 mln.m³ of raw water have been used; out of this amount 16.64 mln.m³ have been used in the Moldavian part of Danube River basin (see 3.1.4.). The proportion of raw water for domestic needs in the Moldavian part of the Danube River basin constitutes 7.1%.

In 1997 abstraction of raw water for domestic needs was approximately at the level of the years 1995 and 1996 and constituted 16-17 mln.m³.

5.1.1.2. Industrial Raw Water Demand

Altogether total industrial raw water demand in Moldova in 1996 was 1128 mln.m³. Industrial raw water demand in the Moldavian part of the Danube River basin was at the level of 7.2 mln.m³. The proportion of raw water for industrial needs in the Danube basin compared to raw water demand for industrial needs in Moldova is quite insignificant and constitutes 0.62%. In 1995 this proportion was 0.7% (8 mln.m³ of water have been used in the Danube River basin and 1093 mln. m³ - total in Moldova).

Table 5.4. Industrial raw water demand in the Moldavian part of the Danube catchment area (1996)

Districts	Raw water demand for industrial needs (mln.m ³)
Briceni	0.40
Ocnita	0.40
Edineti	1.41
Riscani	0.18
Glodeni	0.98
Falesti	0.46
Ungeni	0.78
Nisporeni	0.14
Hancesti	0.11
Leova	0.27
Cantemir	0.43
Cahul	0.76
Vulcanesti	0.10
Chimislia	0.01
Comrat	0.28
Basarabasca	0.11
Chiadir-Lunga	0.24
Taraclia	0.14
Total in the Danube basin	7.20
Total in Moldova	1128
Proportion (%)	0.62

In 1997 the abstraction of raw water for industrial needs was approximately at the level of the years 1995 and 1996 and constituted about 6-7 mln.m³.

5.1.1.3. Agricultural Raw Water Demand for Irrigation

Altogether about 20% of cultivated lands are currently under irrigation. In the Moldavian part of the Danube River basin the irrigation system covers 82,998 ha, however due to various causes not all-available lands in the districts are being irrigated and total surface area of irrigated lands could widely vary from year to year. On average annual water demand for irrigation is a portion of 20 to 70% of seasonal crop water requirements. In 1996 in the Moldavian part of the Danube River basin the average irrigation application rate was 1560 m³ of water per ha.

In 1996 due to raising of fees for water used for irrigation and for electrical energy, and also due to poor conditions of irrigation system the amount of water used for irrigation was 2 times less compared to the year 1995, especially in the Moldavian part of the Danube River basin. Total in Moldova in 1996 raw water demand for irrigation was 274 mln.m³; in the Moldavian part of the Danube River basin - 56.77 mln.m³. Thus, the proportion of total national raw water demand for irrigation in the Danube basin constitutes 21%. In 1995 this proportion was at the level of 26% (105 mln. m³ from the Danube River system and 402 mln.m³ total in Moldova).

Table 5.5. Raw water demand for irrigation in the Moldavian part of the Danube catchment area (1996)

Districts	Water demand for irrigation (mln.m ³)	Total irrigated area (ha)	Currently irrigated area (ha)	Currently not irrigated (ha)
Briceni	2.25	4204	547	3657
Ocnita	1.86	979	-	979
Edineti	3.60	7042	3800	3242
Riscani	2.16	6027	1300	4727
Glodeni	2.06	2312	600	1712
Falesti	1.61	4736	4736	-
Ungeni	4.95	10708	10708	-
Nisporeni	1.90	3329	3329	-
Hancesti	8.59	14163	739	13422
Leova	3.48	6960	691	6269
Cantemir	2.56	8218	4218	4000
Cahul	6.45	13085	519	12566
Vulcanesti	6.57	6337	783	5544
Chimislia	0.12	408	170	238
Comrat	0.81	1176	1171	5
Basarabasca	0.67	365	58	307
Chiadir-Lunga	6.12	2326	2326	-
Taraclia	1.01	1036	788	248
Total in the Danube basin	56.77	93311	36283	56804
Total in Moldova	274	310000		
Proportion (%)	21	30		

In 1996 compared to the year 1995 the abstraction of raw water for irrigation has dropped 2 times in the Prut River basin and in 1.5 times - in the Yalpugh and Cahul Rivers basin. In 1997 water abstraction for irrigation needs was approximately 10% less compared to the year 1996 and constituted about 48-50 mln.m³.

5.1.2. Wastewater Discharge to the Danube River System

In the national statistics there is no data on division of wastewater on municipal, industrial and agricultural ones. To have such information it is necessary to analyze the operation of individual local wastewater treatment plants, because only at this level volumes of municipal, industrial and agricultural discharges are considered.

To carry out rough estimation we used data obtained from analysis of domestic wastewater production (see 3.1.5.), and also statistic data on water use for industry and agriculture. Industrial discharge has been considered as 95% of total amount of water used for industrial needs; agricultural discharge from major point sources was considered as 85% of total amount of water used for agricultural needs.

In 1996 total wastewater discharge into the Danube River system constituted 36.06 mln.m³. From this amount 8.77 mln.m³ represented municipal discharge; 6.93 mln.m³ - industrial discharge and 20.36 mln.m³ have been discharged by agricultural units. 4.89 mln.m³ of these effluents have not been treated at all; the rest portion - 31.17 mln.m³ - have been treated biologically. In Moldova, including Prut River basin and Danubian lakes basin there are no installed advanced wastewater treatment facilities.

Table 5.6. Domestic, industrial and agricultural discharges and the share of their treatment in the Moldavian part of the Danube River basin (1996)

Districts	Domestic discharge (mln.m ³)	Industrial discharge (mln.m ³)	Agricult. discharge (mln.m ³)	Total only dom., ind. and agric. discharge (mln.m ³)	Out of this discharge (mln.m ³):	
					non-treated	biolog. treated
Briceni	0.660	0.38	1.41	2.45	0.07	2.38
Ocnita	0.620	0.20	1.02	1.84	0.33	1.51
Edineti	0.570	1.34	1.62	3.53	0.04	3.49
Riscani	0.090	0.17	0.80	1.06	0.03	1.03
Glodeni	0.610	0.93	1.47	3.01	0.09	2.92
Falesti	0.130	0.44	1.36	1.93	0.03	1.90
Ungeni	2.410	0.74	1.15	4.30	0.13	4.17
Nisporeni	0.120	0.16	0.62	0.90	0.90	-
Hancesti	0.020	0.11	1.48	1.61	0.20	1.41
Leova	0.420	0.26	0.80	1.48	0.23	1.25
Cantemir	0.370	0.31	1.41	2.09	0.36	1.73
Cahul	2.040	0.72	1.57	4.33	0.18	4.15
Vulcanesti	0.110	0.08	1.71	1.90	0.53	1.37
Chimislia	0.002	0.01	0.41	0.42	-	0.42
Comrat	0.300	0.27	1.00	1.57	0.50	1.07
Basarabasca	0.009	0.45	0.41	0.87	0.87	-
Chiadir-Lunga	0.150	0.23	1.29	1.67	0.24	1.43
Taraclia	0.140	0.13	0.83	1.12	0.16	0.94
Total only domestic, industr. and agricul. discharge (mln.m ³)	8.77	6.93	20.36	36.06	4.89	31.17
Proportion, %	23.8	19.2	56.4	100	13.4	86.6

Table 5.7. Wastewater discharge into surface water of the Danube River system (1996)

River system	Discharge amount (mln.m ³)
Prut River	29.98
Yalpugh River	5.71
Cahul River	0.4
Total	36.09

In 1997 the municipal, industrial and agricultural wastewater discharge into surface water of the Danube River system was at the level of 1996. Also, at approximately the same level remained the proportion of non-treated and biologically treated wastewater.

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

There are 22 big and 561 local municipal and industrial solid waste disposals and specialized sites for sanitary treatment of solid waste covering 419 ha with total volume 8229 thousand m³ in the Moldavian part of the Danube River basin. Normally big disposals are located within 8-10 km of each district center or town. Besides, in rural area practically near each settlement is situated local solid waste disposal. There is an information obtained from informal sources that some of these local disposals often are situated directly at the banks of small rivers. At least 25% of authorized disposals are currently exceeding capacity, however further construction of new disposals has been stopped because of economic crisis. Besides, in the Moldavian part of Danube River basin there is a number of illegal dumps with mixed industrial and municipal wastes, which pollute surface water and groundwater. Monitoring data of the Ministry of Health indicate a high level of microbiological contamination of soil in the rural area. In fact, 15% of soil samples do not correspond to microbiological standards. In some localities 25% of soil samples are strongly polluted by helminthes.

There is not a single well-organized hazardous industrial and chemical waste disposal in the Moldavian part of the Danube River basin. According to expert assessment, more than 700 tons of highly toxic waste is in stock, and 580 tons of them are pesticide residues. The rest of hazardous waste is mainly represented by metal hydroxides, petroleum products, oily and cyanide waste.

In spite of the fact that sometimes it is being reported about industrial waste disposals in the districts, in the annual reports on environment state there is no special division of solid waste disposals on municipal and industrial (non-toxic) disposals. Basically, they are collected, stored and treated together.

Table 5.8. Municipal and industrial solid waste disposals (1996)

Towns, districts	number	volume, thous. m ³	area (ha)	authorized (ha)	unauthorized (ha)
Briceni	37	887.90	31.35	-	31.35
Ocnita	11	585.00	34.54	-	34.54
Edineti	44	4240.30	34.26	-	34.26
Costesti (Riscani)	27	393.50	15.05	-	15.05
Glodeni	33	1538.0	27.70	-	27.70
Falesti	40	9.75	32.92	2.90	30.01
Ungeni	51	16.40	36.30	5.20	31.10
Nisporeni	29	8.70	11.25	11.25	-
Hancesti	43	97.50	13.50	3.80	9.70
Leova	40	43.43	10.20	10.00	0.20
Cantemir	33	15.75	33.00	28.50	4.50
Cahul	35	95.75	29.60	20.10	9.50
Vulcanesti	43	111.20	39.70	28.10	11.60
Chimislia	10	7.24	4.30	1.30	3.00
Comrat	35	48.80	26.00	26.00	-
Basarabasca	6	7.39	2.20	2.00	0.20
Chiadir-Lunga	40	185.00	13.50	9.80	3.70
Taraclia	26	22.28	24.00	13.50	10.50
Total in the Danube River basin	583	8228.89	419.37	152.48	266.90
Total in RM		30529.5	1220.25	493.11	727.14

There is a big stock of expired and prohibited pesticides in the district Vulcanesti. The consequence of Moldova's agriculture transition to the intensive technologies in crop production was the reason for substantially increased use of pesticides. In 1974 the Government made a decision to construct a special dump for expired and prohibited pesticides (such as DDT and others). The site for dumping (near village Chimicioi in the Yalpugh River basin) has been chosen by geological and sanitary-epidemiological services. From 1978 to 1987 the storing of pesticides occurred. According to various estimations, currently there are in stock from 3000 to 35000 tons.

Besides, in each district on the Moldavian part of the Danube River basin, except Ungeni, there is a certain amount of stored non-used and prohibited pesticides. However in the reports on environment state obtained from local ecological inspectorates there is no detailed descriptions, how and where they are stored. Normally, these disposals represent roofed opened sites without special arrangements for prevention pollution of soil and water.

Table 5.9. Non-used and prohibited pesticides (1996)

District	Total non-used pesticides (tons)	including prohibited (tons)
Briceni	144.36	17.54
Ocnita	1.60	0.83
Edineti	4.62	0.76
Riscani	22.10	5.20
Glodeni	14.70	2.20
Falesti	1.80	-
Ungeni	-	-
Nisporeni	26.63	3.59
Hancesti	10.82	1.58
Leova	3.47	-
Cantemir	22.64	8.54
Cahul	38.41	5.30
Vulcanesti	9.10	-
Chimislia	26.30	3.39
Comrat	45.55	5.09
Basarabeaca	7.79	7.00
Chiadir-Lunga	21.85	12.10
Taraclia	73.62	2.71
Total in the Danube basin	475.36	75.83
Total in RM	1150.91	230.28
Proportion	41.7 %	32.9 %

5.1.4. Hydro Power

There is one hydroelectric power plant (HEPP) in the Moldavian part of the Danube River basin on the Prut River - Costesti-Stanca. According to agreement with Romania, it operates on a parity basis, i.e. on average one week it produces electricity for Moldova, one week - for Romania. Because of this circumstance its total electrical capacity could not be estimated precisely. According to rough assessment, in 1994 the total electrical production was 92 mln.kWh; in 1995 - 170 mln.kWh; in 1996 - 174 mln.kWh, and in 1997 - 174 mln. kWh. The annual share of Costesti-Stanca hydro power plant in the total electricity production of Moldova is quite insignificant.

Altogether in 1997 in Moldova have been producing 1354.9 mln. kWh, while electricity produced by Costesti-Stanca power plant constituted 87 mln.kWh. So, in 1997 the share electricity produced by Costesti-Stanca hydro power plant in total national electricity production was 6.4%.

Table 5.10. Some indexes of electricity production in Moldova

Year	Total electrical production in Moldova (mln.kWh)	Costesti - Stanca HEPP electrical production (mln.kWh)	Share of total electrical production (%)
1994	1240.4	46.0	3.70
1995	1181.4	84.5	7.15
1996	1400.3	86.6	6.20
1997	1354.9	87.1	6.40

The Costesti-Stanca dam is completely closed; any fish pass had not been foreseen in its project. The reservoir bottom is strongly silted; fish spawning-grounds in the upper part of Prut are mostly destroyed due to alteration and destruction of natural riverbanks.

5.1.5. River Fisheries

There are no industrial fisheries in Prut River itself due to its boundary status. However for fish farming are used Costesti-Stanca reservoir on Prut River; four Manta lakes in Prut River corridor and eight Cahul lakes located in the downstream of Prut River. Besides, numerous reservoirs situated at the small tributaries of Prut River and in the basin of Yalpugh and Cahul Rivers are used for fish farming as well. Altogether in 1996 from the Danube River system have been abstracted 10.98 mln.m³ of raw water for fish-farming; from the Prut River have been abstracted 9.48 mln.m³ in district Cahul; from the Cahul River have been abstracted 1.5 mln.m³ in district Vulcanesti. The proportion of raw water abstracted from Danube River system for fish farming constitutes on average 25% of total water used for these purposes in Moldova.

There are several big reservoirs, which are used for fish-farming in the Moldavian part of the Danube catchment area: Calicauti (Dradise River); Cupcini (Chugur River); Sturzeni (Camenka River); Danu and Viisoara (Galdarusa River); Limbeni-nou and Limbeni-veci (Shoveti and Shoveti-mare rivers relatively); Sarata-nou, Scumpia, Choropcani-nou (Girlo-mare River), Zagoranca (Vladnic River); Ungeni (Delia River); Milesti and Bratuleni (Bratuleni River); Lapushna and Carpineni (Lapushna River) and others. In 1986 fish harvesting at fish farms in the Moldavian part of the Danube River basin constituted 220 tons. Currently about 35% of these fish farms are in the private property and there is no available statistic data on fish harvesting in them. In 1996 total fish harvesting in the Moldavian part of the Danube River basin considered in the national statistics constituted 805.7 tons, including 800 tons from the artificial reservoirs belonging to Association "Prut" (compared to 9000 tons in 1986 and 2000 tons in 1990) and 5.7 tons from the natural lakes (compared to 76 tons in 1990). The market value per kg of river fish constitutes on average 4-5 lei (or 0.9-1.1 USD).

Prut River itself is used for fisheries only by people living in the towns situated close to river and from riparian villages.

Table 5.11. Fish harvesting in the Costesti-Stanca reservoir and Manta lakes (tons)

Waterbodies	1985	1987	1990	1993	1994	1996	1997
Manta	107.5	52.6	32.1	30.0	3.4	1.2	-
Costesti-Stanca	10.9	23.0	42.7	9.8	5.8	4.5	5.1
Total	118.4	75.6	74.8	39.8	9.2	5.7	5.1

5.1.6. River Shipping

Within a long period Prut River has not been used for passenger and freight transportation at the national level because of its status of the state boundary between Moldova and Romania and in the past the access to Prut River was strictly limited. Currently Prut River is not used for navigation as well, except for some local activities. There is no import/export share in total country's trade balance by shipping via Prut River.

The river shipping mostly refers to short-distance freight transportation and linked with local activities on sand extraction from riverbed. Theoretically for freight transportation could be used 530 km from mouth of Prut River to dam Costesti-Stanca. It has been also assessed that theoretical

availability for freight transportation from harbor Giurguilesti to the wharves Cahul (distance from Giurguilesti 77 km) and Stoianovca (distance-156 km) constitutes 300-500 tons. To wharves Leova (215 km) and Ungeni (375) could be used freight barges with capacity 200-300 tons. Approximately estimated cost of theoretically available freight transportation for 1 ton per one km is 0.11 Lei (0.02 USD).

However, available distance is used only partly. In the middle - and downstream of Prut River there are several segments, which are used for short-freight transportation of quarried sand for home needs. The Prut River freight fleet is based in the wharf Cahul, situated at the distance 78 km from mouth. In case of necessity linked with carrying out of certain works this fleet could be replaced. Normally, the distance more or less constantly used for freight transportation constitutes 10 km near wharf Ungeni, 2 km near Giurguilesti and 5 km near wharf Cahul. In 1997 the weight of transported sand and sand-gravel mixture constituted 34.1 thousand tons.

Altogether in Moldova there are 5 freight vessels, 15 freight barges and 11 tugboats. The share of freight barges and tugboats belonging to the Prut River fleet constitutes 53% and 64% relatively.

Table 5.12. Availability of home water transport

Category	in Moldova	Prut River	Share (%)
Freight vessels	5	-	-
Freight barges	15	8	53
Tugboats	11	7	64
Passenger vessels	3	0	-

Table 5.13. Freight traffic and transport

Category	in Moldova		Prut River		Share
	1996	1997	1996	1997	1996
Freight transport (mln. tons/ year)	0.150	N/A	0.015	0.034	23%

5.1.7. Water Related Recreation/Tourism

Prut was the boundary river of the former USSR during 45 years. This entailed the creation of a buffer strip of 3-4 km wide, which had an important water protection functions. Currently Prut River forms a state boundary between Moldova and Romania. Because of these circumstances Prut River had before and has now a special mode of access and use. In particular, for a long time the human activity was strongly restricted in this area. In the first turn, these limitations related to such activities as recreation and tourism in this area, and Prut River has never being used for recreation at the countrywide and local level. Currently only Costesti-Stanca reservoir is partly used for recreation by people from localities situated close to river, but it mostly refers to so called “wild” tourism and there is no statistic data concerning this activity.

According to approximate assessment, in summer time on week-ends and vocations the number of recreating people along about 1 km of Costesti-Stanca reservoir shore approximately constitutes 100 persons per day; on average the quantity of left rubbish from each person is about 1-1.5 kg. So, the amount of daily rubbish in that time could be assessed as 100-150 kg, what is an additional source of environment pollution. Generally, Prut River is not considered as a factor of national and international tourism; it is not used by passenger and tourist ships, for water sport and swimming. The quality of Prut River is considered sufficient for domestic water supply, industrial and agricultural needs after proper treatment, for irrigation and fish farming needs.

5.2. Projection of Expected Economic Significance/Impacts

5.2.1. Projection of Abstraction of Raw Water

According to the national plan of economic development elaborated in the past it was supposed that water use and relative abstraction of raw water will increase significantly and by the year 2005 will reach about 3500 mln.m³. However, currently the existing “Complex Scheme of Water Supply and Sewerage Systems Development until the year 2005” is being revised and water management experts think that abstraction of raw water in Moldova will be at the level of 2500 mln m³ by the year 2010 and 3370 mln.m³ by the year 2020. The abstraction of raw water from the Danube River system is estimated to be 207 mln.m³ in 2010 and 285 mln.m³ in 2020. For domestic needs will be abstracted 36 mln.m³ in 2010 and 59 mln.m³ in 2020; for industrial needs 15.5 mln.m³ in 2010 and 21.4 mln.m³ in 2020; for irrigation needs - 75 mln.m³ in 2010 and 85 mln.m³ in 2020; for other needs - 45 mln.m³ in 2010 and 60 mln.m³ in 2020.

Table 5.14. Projection of abstraction of raw water from the Danube River system

Categories	In Moldova		Danube system		Proportion %	
	2010	2020	2010	2020	2010	2020
Total abstraction (mln.m ³), including:	2520	3370	207	285	8.20	8.45
domestic needs	350	600	36	59	10.20	9.80
industrial needs	1500	2000	16	21	1.06	1.05
irrigation needs	380	410	75.0	95.0	19.74	23.17
agricultural needs	100	140	35.0	60.0	35.00	43.00
other needs	190	220	45.0	60.0	28.00	27.20

5.2.2. Projection of Wastewater Discharge

It is assumed that total wastewater discharge from municipal, industrial and agricultural sectors into the Danube River system will be at the level of 64.1 mln.m³ in 2010, including 19.6 mln.m³ of domestic wastewater discharge, 14.7 mln.m³ of industrial wastewater discharge and 29.8 mln.m³ of agricultural wastewater discharge. In 2020 the total wastewater discharge will constitute 106.2 mln.m³, including 34.9 mln.m³ of domestic wastewater discharge, 20.3 mln.m³ of industrial wastewater discharge and 51 mln.m³ of agricultural wastewater discharge. Also, it is supposed, that proportion of non-treated wastewater will constitute 3% in 2010 and there will be no non-treated part of wastewater in 2020; the proportion of biologically treated wastewater will constitute 87% in 2010 and 75% in 2020; the proportion of advanced treated wastewater will be 10% in 2010 and 25% in 2020.

Table 5.15. Projection of wastewater discharge into the Danube River system

Discharge (mln.m ³) including:	Years	
	2010	2020
domestic	19.6	34.9
industrial	14.7	20.3
agricultural	29.8	51.0
total	64.1	106.2
out of this amount proportion (%), or amount:		
non-treated	3%, or 1.9 mln.m ³	-
biologically treated	87%, or 55.8 mln.m ³	75%, or 79.7 mln.m ³
advanced treated	10%, or 6.41 mln.m ³	25%, or 26.6 mln.m ³

5.2.3. Projection of Other Major Impacts

Currently the building of harbor for oil terminal in Giurgiulesti is ongoing and is expected to be finished by the year 2000. The harbor will be located at the distance 50-100 m from the confluence of Prut and Danube Rivers. The project of harbor building had been elaborated by firms "CIPROSERVING" (Moldova) jointly with "Triton" (Greece) and "Perspective" (Moscow, Russia); feasibility study has been performed by "Frederick Harris" (The Netherlands).

According to assessment, a certain impact on ecosystems is expected due to harbor operation: destruction of local wetlands; destruction of benthos communities on the river bottom with surface area about 1000-1300 m². The expected impact includes also probable accidental spills and premeditated discharges; muddying of water; bottom siltation; direct destruction of habitats; alteration of water quality and regime of its circulation; banks erosion resulting from alteration of hydrological regime etc.

According to the project documentation, because of harbor operation the following emissions into the air basin are expected annually: NO_x - 58.88 tons; CO- 51.83 tons; soot - 6.88 tons; benz(a)pyrene - 4x10⁻⁵ tons; SO₂ - 36.03 tons; hydrocarbons saturated - 107.08 tons; benzene; toluene; polycyclic aromatic hydrocarbons - 1.6 tons; H₂S - 6x10⁻⁴ tons; hydrocarbons unsaturated - 24.76 tons; phenol - 9x10⁻⁴ tons; manganese and its compounds - 17x10⁻⁴ tons; dust - 6x10⁻⁵ tons; CaCO₃ - 12x10⁻⁴ tons; HCl - 4x10⁻⁶ tons; H₂SO₄ - 6x10⁻⁶ tons; HNO₃ - 4x10⁻⁶ tons; acetone - 32x10⁻³ tons; ammonium - 154x10⁻³ tons; lead and its oxides - 18x10⁻¹⁰ tons; metallic dust - 2x10⁻³ tons; hydrocarbons from transport emissions - 33194 ton. However, according to expert assessment, the concentration of these substances will not exceed the indexes of maximum admissible concentrations due to their dispersion in the air basin, and thus, a substantial impact on population health in the adjacent area is not expected.

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

6.1. Documentation and Short Analysis of the Relevant Legal Framework

Generally, without clear legislation, effective institutions, conceived policies and actions to address environmental priorities they can not be forced into the practice. So, for the improving of institutional performance there should be: i) established transparent legislation; ii) clear assigned institutional responsibilities; iii) ensured capacities for implementation.

Currently in the Republic of Moldova there is a complex system of environmental legislative and normative acts. A considerable part of environmental laws have been adopted during centralized economic system before Soviet Union was collapsed; some environmental laws and normative acts have been elaborated recently in the conditions of transition period to the market economy.

The Constitution of the Republic of Moldova provides general statements in the field of environmental protection. According to Constitution, the rights of people to live in a favorable environmental conditions is guaranteed. Also, the State guarantees the free access of each citizen to the information on environmental state and wide dissemination of these information.

The President of the Republic is responsible to the world community for the state of environment. Also, he represents the interests of Moldova on environment protection at the international level.

The legal framework for environmental protection in those part, which concerns sound management of water resources and ecosystems, comprises the number of laws.

Table 6.1. Environmental laws in the republic of Moldova

Laws	Year
The Constitution of the Republic of Moldova	1994
Forest Code. Law of the Republic of Moldova	1979
Air Basin Protection	1981
Protection Areas of Rivers and Lakes	1983
Soil Code/Land Code. Law of the Republic of Moldova	1991
The Law on Environmental Protection	1993
Water Code of the Republic of Moldova. Law of the Republic of Moldova	1993
Code on Underground Resources. Law of the Republic of Moldova	1993
Monuments Protection	1993
Sanitary-Epidemiological Assurance of the Population	1993
Civil Protection	1994
Fauna. Law of the Republic of Moldova	1995
Health Protection	1995
Environment Impact Assessment	1996

Also, a number of law drafts have been elaborated and adopted by the Government: on Hazardous and Toxic Chemicals Regime; Enlargement of State Protected Area Fund and Waste Management.

In 1993 the Parliament of Moldova made a decision on Adherence of the Republic of Moldova to the International Conventions. In 1995 the Parliament of Moldova has ratified conventions on Biological Diversity (Rio de Janeiro) and Climate Change (Rio de Janeiro). Besides, Moldova jointed some European Conventions: on Wildlife and Natural Habitats Protection (Bern, 1979); on Large-Scale Transboundary Air Pollution (Geneva, 1979); Bucharest Declaration (1985); on Environment Impact Assessment in the Transboundary Aspect (Espoo, 1991); on Transboundary Effects of Industrial Accidents (Helsinki, 1992); on Protection and Use of Transboundary Waters and International Lakes Protection (Helsinki, 1992). The Danube River Convention (Sofia, 1994) is expected to be ratified in autumn 1998.

Besides, there are following decisions of the Government of the Republic of Moldova related to environment protection and water resources and ecosystems protection and management.

Table 6.2. Governmental decisions related to environment management

Government decisions	Year
State Protection of Natural Resources and Natural Complexes on the Territory of the Republic of Moldova	1975
Fee for Water	1984
Approval of some Regulation on Protection Corridors and Belts for Small Rivers and Lakes	1986
Protection Measures to be undertaken for the Prut River	1986
Ecological Background of Building and Reconstruction of Big Objects	1986
Severe Deficiencies in the Enforcement of the Governmental Decision on “Strengthening of the Control for Pesticides and Plant Growth Regulators Use in the National Economics in order to Avoid Negative Impact on Human Health”	1987
Prior Actions to be undertaken for Improving of Water Resources Use in Moldavia	1988
Reorganization of the System for Environmental Protection in the Republic of Moldova	1988
Program for Rural Localities Water Supply in Moldavia	1989
Urgent Actions to be taken for Improving of Ecological Situation in Moldavia	1990
Activity in the Respect of Chemical Wastes and Non-used Pesticides Rendering Harmless Admitted on the Territory of the Republic of Moldova	1991
Creating of State Reserve “ Lower Prut ”	1991
Measures to be undertaken for Harmonization of Social and Economic Development of the Southern Part of Moldova	1991
Prior Actions to be taken for Water Supply Improving in the Southern Districts of Moldova	1992
Coordination Activity in Use and Protection of Underground Waters	1992
Regulations of the State Association for Geological Research and Topographic-Geologic Activity “AGeOM” of the Republic of Moldova	1992
Compensation for Damage Resulting from Forest Law Violation	1992
Regulation of Water Management	1994
Approval of the State Water cadaster	1994
Main Functions and Organizational Structure of the Department for Environment Protection	1994
Creating the State Forestry Association “ Moldsilva” under Supervision of Ministry of Agriculture and Food	1994
Approval of the Complex Scheme for Water Supply and Sewerage Systems Development until 2005	1994
Regulations of Underground Resources Use	1994
Putting into Force the Agreement between the Republic of Moldova and Ukraine “ On the Common Use and Protection of Transboundary Waters”	1995
Approval of the State Program for Human Health Protection in 1995-1997	1995
Approval of Statute of the Department for Standards, Metrology and Technical Supervision	1995
Action Plan for Environmental Protection	1995

In the Law on Environment Protection the priority of international conventions and agreements over national legislation in the case of arising some contradictions is confirmed.

Generally the Law on Environmental Protection, environmental legislative and normative acts, the decisions of Government of the Republic of Moldova and a system of international cooperation in the field of environment protection approved by the Parliament of Moldova provide a system of ecological security for people, eco-systems, water, air and land. This system provides also the base and hierarchy for adequate environment management, including use of natural resources and biodiversity conservation; the rights and responsibilities for environment protection of central and local authorities; stipulates the developing of ecological funds intended for financing of various environmental programmes.

The fund of protected areas and objects in Moldova has been established by the decision of Government in 1975 and it is divided into next categories:

- State Natural Reserves
- State Natural Landscapes
- State Natural Parks
- State Nature Monuments
- Horticultural Art Monuments
- State Reservations for Wild Animals
- Rare Species of Animals and Plants

Currently the total fund of state protected areas constitutes about 1.45% of the territory of Moldova. Over the last years new natural reservations have been created; their total surface area increased from 0.19% in 1990 to 0.94% in 1994.

The Natural Reservation “Lower Prut” represents a wetland ecosystem of lower Prut River, including lake Beleu and adjacent forestry area. It was created in 1991; total surface area constitutes 1691 ha.

The National Forest Reservation “Padurea Domneasca” representing a forestry ecosystem of the middle part Prut River basin has been created in 1994 with total surface area 6032 ha; it is designed for protection and maintenance of typical for this area species of plants and animals.

Apparently, the existing fund of protected areas is still insufficient for the large scale ecological maintaining and conservation of biodiversity, and the enlargement of protected areas is planned. The new draft provides the territorial enlargement of state natural reservations up to 1.38%. According to new law draft, the total surface area of protected lands including extended surface area of protected natural landscapes will constitute 2.18% of the territory of Moldova.

Table 6.3. The fund of territories and natural subjects under state protection

Category of territories and subjects	Number of. objects	Surface area (ha)
State aquatic and wetland vegetation reservations	3	2970
State forest reservations	3	16851
Nature Forest Reserves	8	2739
Nature Steppe Reservation	1	56
Natural landscapes:		
i) forestry sectors	10	15054
ii) aquatic and wetland vegetation	2	434
Nature monuments:		
i) geologic and paleontologic	92	2465
ii) hydrologic	27	46.7
iii) specific vegetation sector	18	6948
iv) steppe sectors	4	77
v) forestry sectors	28	925
vi) secular trees	372	
Horticultural art monuments	20	373
Reservations for wild animals	1	20
Rare species of animals	108	
Rare species of plants (vascular)	96	
Total	793	48958.7

6.2. Analysis of Relevant Institutional Framework

The system of environmental quality management is performed in detail in the Law on Environmental Protection. In this Law general strategy, principles and statements of environment protection in the Republic of Moldova are defined; actions to be taken and defining terms of their enforcement, and responsible institutions are described. According to the Law, the power of Parliament in environmental protection has been significantly widened. Thus, along with elaboration of ecological legislation, normative acts and state policy, the Parliament will approve the national programmes on environmental quality, limits for natural resources use, waste disposals, emissions and discharges of noxious substances. The most important role in the decision of environment issues in Moldova belongs to the Ministry for Environment Protection. There are next important functions of Ministry:

- control on environment quality
- control on natural resources use; elaboration the limits on natural resources use
- elaboration the limits on emissions into the environment and limits on industrial and municipal waste storage
- ecological expertise, assessment and monitoring
- organization and coordination of environmental scientific research
- management of protected areas
- protection of natural ecosystems and landscapes
- elaboration of legislative and normative acts on environment protection

At the same time the Ministry for Environment Protection jointly with other structures of Government participates in the elaboration of ecological programmes designed for improvement of environmental state. The main responsibility in the implementation of actions on environment

protection at the national level belongs to the Government of the Republic. It adopts decisions on natural resources use and elaborates cadasters on resources; on protection of nature monuments, landscapes, land plots alienation, and on sites for waste disposals. According to Law, the Government is obliged to follow the principles of sustainable development, what requires from both local authorities and economic units to promote:

- protection and improvement of soil
- water consumption reduction and prevention of its loss, applying of closed cycles of water used
- saving of energy; search of alternative sources of energy
- applying of new technologies to achieve water and air pollution reduction
- reduction of natural resources use, their protection and maintenance

According to the concept of decentralization in the environment protection activity, local authorities have responsibility for quality of environment and state of human health. They elaborate local programmes for improvement of environment quality, declare local nature monuments, declare in case of necessity zones of ecological disaster. The local authorities perform on their territory the control over rational use of the natural resources, including rational use of water resources, and environmental protection activity. They are also responsible for land use; restoration of landscapes through optimal organization of territories; activities toward soil improvement, afforestation. Also, local authorities approve plans of territorial arrangements, administer all public works in accordance with adopted projects of urbanization and planning. Local programmes on environmental rehabilitation and protection are also provided by local authorities in accordance with decisions of relevant departments.

In general the system of state ecological control includes: i) ecological inspectorate; ii) ecological expertise; iii) ecological prosecution, and iv) ecological monitoring.

Ecological inspectorate is qualified to stop on its own initiative or on the suggestion of local authorities any activity in case of its contradiction with environmental legislation; to submit claims to private and juridical persons for removal the damage to environment resulting from pollution or non-rational use of natural resources; to demand that units, which do not observe the legislation on environmental protection, will be disciplinary punished; to follow the violations of environmental legislation.

Ecological expertise is implemented by special unit of the Ministry for Environment Protection. This activity represents the comprehensive study of ecological, social and economic factors to ensure ecological requirements in the context of local peculiarities, condition of ecosystems and their resistance to negative effects resulting from enterprises operation.

Ecological prosecution realizes the strict observance by economic units and various institutions of Law on Environmental Protection, Water Code, Forest Code, Underground Resources Code, Land Code, Civil Code, Law on Air Basin Protection and normative acts issued by Government.

Water quality monitoring is crucial part of environment management because water plays a basic role in life of any aquatic and terrestrial ecosystem and in human life, and therefore monitoring has two global purposes: 1) reveal the existing situation, and 2) to assess risk for environmental health. In this connection the Ministry for Environment Protection should: 1) to determine the priorities on: a) territories with highest index of pollution, b) pollutants (especially in “ hot-spots”), which adversely affect on humans health and ecosystems, and c) actions to be taken; 2) to elaborate the adequate system of monitoring according to these priorities; 3) to elaborate criteria for aquatic life; 4) to realize adequate water quality management, and 5) to take relevant actions in the limits of its competence.

Currently in the Republic of Moldova following environmental units are involved in the system of water quality monitoring and assessment:

- The Ministry for Environment Protection
- The Ministry of Health (National Center for Scientific and Applied Preventive Medicine)
- The Ministry of Agriculture and Food
- The Association of Geology of Moldova (AGeoM)
- In the structure of the *Ministry for Environment Protection* are involved:
 - *State Ecological Inspectorate* (Kishinev) and 5 regional agencies with laboratories for water quality control (including Cahul and Ungeni) - realize monitoring of *surface waters*
 - *The Hydrometeorological Service* with central analytical laboratory (Kishinev) and countrywide network of local laboratories analyzing data of 40 hydrological water quality stations and of a number mobile groups for water sampling realizes monitoring of *surface waters*.
- *The National Center for Scientific and Applied Preventive Medicine* as a subdivision of *Ministry of Health* carries out the control of *drinking water (tap water; wells and springs)* on physico-chemical and microbiological parameters. It involves the main analytical laboratory in Kishinev; 4 laboratories in district centers and 45 local laboratories.
- *The Ministry of Agriculture and Food* through its subdivisions state consortium “Apele Moldovei”, State Chemical Commission, Association “Prut” and “Moldsilva” realizes *pesticides and fertilizers control, survey water quality control at fish farms etc.*
- *Association of Geology of Moldova (AGeoM)* explores *underground water resources* and surveys *quality of underground waters*.

Table 6.4. System of water quality and quantity monitoring in Moldova

Type of water	Responsible unit
Surface water: rivers streams lakes ponds reservoirs fish farms	Ministry for Environment Protection State Water Management Consortium “Apele Moldovei” Ministry for Environment Protection Ministry of Agriculture and Food
Underground water: wells springs	Ministry of Health
tap water	
Tap water	Ministry of Municipal Service and Housing
Underground water (deep)	Association of Geology of Moldova

Generally, the efficiency of existing system for water quality monitoring is quite poor because its enforcement is not coordinated; parameters are not registered systematically and regular; monitoring equipment often is old-fashioned, out of order, or it is not kept in good conditions (e.g. its calibration is not proper, or it is used by unskilled personnel etc.). Currently there is a necessity that for realizing of water quality monitoring would be responsible one institution, and the most proper one is appeared to be the Ministry for Environment Protection. In existing conditions at least

two options of transfer of monitoring function from other institutions to Ministry could be possible: i) financial re-subordination of relevant analytical laboratories to the Ministry; or ii) introducing into the steering committee of the Ministry the heads of relevant institutions. Apparently, the activity of Ministry for Environment Protection itself should be also more effective and flexible.

Water Quality Management Units in Moldova

Ministry for Environment Protection is responsible for: environment management; license on discharges into surface waters (jointly with Ministry of Health); monitoring of surface waters (through Hydrometeorological Service and State Ecological Inspectorate). Subdivision of Ministry - National Institute of Ecology - provides a scientific support of ministerial activity; elaborates standards of environment quality and action plans; coordinates all scientific environmental research in Moldova. Hydrometeorological Center is also responsible for floods warning.

Ministry of Health. The National Center for Scientific and Applied Preventive Medicine is responsible for sampling and analysis of surface and underground water used as a sources for drinking water.

Ministry of Agriculture and Food. The subdivision of Ministry - Water Consortium “Apele Moldovei” is responsible for management of surface water resources and keeping records on water balance in rivers during water abstraction and discharge; for preparing of technical background for hydrotechnical constructions and their exploitation (including drainage system); for domestic water supply and regime of water use; keeping of protection zones and corridors along the rivers; for flood control and flood protection, for wetland restoration.

Ministry of Municipal Service and Housing is responsible for the communal service of localities, including direct water supply of urban and rural population, solid waste disposals, wastewater treatment; for establishment of standards (jointly with Ministry of Health and Ministry for Environment Protection); for operation and maintenance of the wastewater utilities.

Association of Geology of Moldova is responsible for preparation of cadaster of underground water resources; for their annual assessment; for underground water quality and quantity monitoring.

Solution of water management issue will require the strengthening of environmental institutions and re-arrangement of institutional infrastructure, which will be directed at the harmonization of relations among relevant units, which are responsible for state, assessment, maintenance and restoration of environment, because existing system of environmental control does not correspond to requirements of adequate environment management. So far environmental issues cut across sectoral boundaries and involve many diverse organizations (units). The Ministry for Environment Protection should create the structure and mechanism of coordination of “vertical” and “horizontal” information flows; improve institutional coordination; organize the adequate environmental monitoring; elaborate appropriate short-, medium- and long-term environmental programmes.

Currently in Moldova there exists no:

- coordinated activity of institutions, which are involved and responsible for assessment, improving state of environment (Ministry for Environment Protection, Ministry of Health, Ministry of Agriculture and Food, State Committee for Pesticides, Association of Geology of Moldova etc.);
- system of ecological control, which would include the inventory of toxic chemicals and their database; criteria for risk assessment for toxic, hazardous and potentially hazardous chemicals for aquatic life, i.e. numerical concentrations or qualitative evaluation of pollutants in water, which provide restoring and maintaining of chemical, physical and biological integrity of waters;
- adequate system of environmental monitoring
- realistic water quality standards;
- methodology for comprehensive evaluation of environmental monitoring data.

7. Description and Analysis of Actual Policies and Strategies

7.1. Actual Policies and Strategies

Within last years in Moldova it has been done much to improve the ecological situation and to ensure the rational use of natural resources. However, currently it is quite complicated because of difficulties of transition period to market economy and lack of financial resources to support environmental programmes; lack of distinct legal framework outlining the responsibilities of central and local authorities; insufficient power of environment protection authorities and poor economic discipline.

The system of actual policies and strategies has been elaborated over last few years and it is being realized at two levels - administrative and economic. At the administrative level the ecological control has been strengthened because of occurring of a big number of environmental law violations. In order to minimize the environmental damage resulting from construction and reconstruction of economic enterprises obligatory Environment Impact Assessment has been introduced. To prevent the environment pollution the allowed rates of pollutants in aquatic and air basins were defined by the Moldstandard and Ministry for Environment Protection; state standards of the former Soviet Union have been approved as a national standards. A number of activities related to environment has to be considered, approved and licensed to relevant organizations: exploitation of underground resources not related to the their extraction; exploitation of mineral water resources; use of natural resources; ecological audit; waste treatment; elaboration of ecological ground in the project documentation; training of environmental specialists etc.

According to the Law on Environment Protection, a number of economic instruments are provided: charges for natural resources use (water, soil, flora, fauna); fees for environmental pollution; fines in the case of ecological legislation violation; fiscal discounts for rational use of the natural resources, installation of environmental friendly technologies, for waste reduction, use of closed water cycles in technological process etc.

Currently in Moldova quite a small share of domestic gross product is established by Government for expenditures on environment protection activity, maintenance of healthy environment and restoration of natural resources.

Table 7.1. Expenditures for environmental protection in Moldova

Category	1993	1994	1995	1996	1997	1998 prognosis
Total (thousand lei)	12537	57735	73177	91912	13866	20972
including:						
current expenditures	8645	41997	56501	80724	-	-
capital reparation	976	3257	4975	3769	-	-
capital investments	2917	12481	11701	7418	13866	20972
Out of total:						
from budget	5948	21487	18834	26959	19157	25287
from "Moldsilva"	1849	6206	5500	8620	3600	5000

Currently the opportunity to consider the expenditures for environmental protection as a fee for environmental pollution is under discussion. It relates to expenditures of enterprises on installation of non-polluting technologies and equipment for waste recycling; construction and reconstruction of local waste treatment plants; for re-equipping of fuel-burning stations for converting them into ecologically clean; for installation of equipment for neutralization of transport emissions etc.

According to the government decision in 1990 the special non-budgetary National Environment Protection Fund has been created. The National Environment Protection Fund and local environmental funds, replenished by pollution fees and user charges, should provide the financing of environmental programmes and cost of efficient operation of the environment management system. Ecological Funds at the different levels (national, municipal and local) had been created in order to gather supplementary environment protection and ecological reconstruction. These Funds are not subject to taxation or other payments. The sources of non-budgetary ecological fund are: part of land tax established by Parliament; charges for land and water use, environmental pollution fees; fines for damages to nature through the sale of the production obtained by illegal exploitation of flora and fauna; voluntary donations and contributions. All these means are collected on a special account at the local and municipal level and are distributed among national, municipal and local ecological funds by the next way:

- charges for the soil and underground resources use beyond the established limits; for extraction of raw materials and fees for soil pollution (except underground water): 30% to the national fund and 70% to the local or municipal funds
- fees for water pollution in permissible limits: 51% to the national fund and 49% to the local or municipal funds
- penalties for accidental discharges or emissions of noxious substances: 70% to the national fund and 30% to the local or municipal funds
- the ecological fund could be used only within the limits of the following activities:
- elaboration and implementation of local and national programmes for environmental and biological diversity protection
- construction and reconstruction of units for environment protection
- acquisition of technical means, devices and equipment for the laboratories of the Ministry for Environment Protection and its subdivisions throughout the country
- scientific research in the field of environment protection
- teaching and training of personnel
- propagation of ecological knowledge
- organization and support of international cooperation in environmental protection

In the National Environmental Action Plan of the Republic of Moldova (1995) main strategies, policies and prior environmental reforms on environment and water pollution reduction, on socio-economic development toward sustainable development and healthy environment have been outlined. The most important issue is to keep balance between economic reforms conducting and applying of ecological approach in the industrial and agricultural development. In this connection the Government is going to start the reforming of national economy toward rehabilitation of environment, what implies the elaboration and use of advanced technologies; new technical level of industrial and agricultural processing based on the preservation of natural resources, including energy resources, what finally should promote the rehabilitation and maintenance of environment. In fact, priority actions related to protection of natural resources, enlargement of forestry area and protected areas include: enforcement of status in the existing protected areas; establishment of protective status in the Lower Prut National Park and in remaining wetlands in the lower Prut in accordance with Ramsar Convention; improving of monitoring and enforcement of status to protect forest resource; establishment of strictly enforced penalties and financial rewards for illegal logging; developing of public awareness programs toward protection scarce natural resources from illegal activities.

At the macro-economic level state policy will be oriented at the effective economic policy, which should promote minimum damage to environment. At the micro-economic level state policy will be oriented at the integrating of principles of environment protection approach into all sectors with

introducing of environmental friendly technologies, reducing of local raw materials use and energy consumption. In the National Environmental Action Plan the strategies in conducting of reforms in agricultural sector, and economic mechanism of natural resources management have been outlined. Regarding the agrarian reforms a special attention will be paid to the observance of ecological requirements. It means that: areas designed to be protected by state must be excluded from privatization list; in the process of privatization the spatial distribution of the private plots to increase conservation efficiency should be taken into account. Also, ecological requirements include transition of agricultural technologies on the biological basis with a minimum use of pesticides and chemical means for plant growth regulation; stimulation of ecologically clean production; use of restrictions in areas highly vulnerable to erosion and posing major risk to water resources; observance of agricultural microtechnologies, which are based on territorial management scheme and on crop rotation system; improving of agro-ecological training for managers of agricultural units; establishing a pilot watershed conservation projects with participation of private landowners; research and education programmes on sustainable agricultural practices, including integrated pest and nutrient management, efficient irrigation, and conservation tillage practices.

In agricultural sector the transition from concentrated and excessive forms of organization to a system of use of agro-environmental possibilities of soil and on bio-ecological principles will be encouragement. However, taking into account the process of privatization, the following ecological issues are to be considered: financing of environmental programmes from means obtained from privatization; promoting the privatization of environmental non-friendly enterprise, which are important for development of national economy; prior privatization of units, which need to be replaced to other areas or to be reconstructed in order to cause less damage to environment, responsibility for previous pollution and stored wastes.

Economic mechanism of natural resources management is supposed to be focused at the stimulation of cautious use of renewed and non-renewed resources. Normally, this mechanism is realized through credit-financial and budget-tax policy and expressed in planning and state financing of activities on exposure, assessment, protection of natural objects and restoring of violated or exhausted natural resources; charges for natural resources use and fees for environment pollution; easy tax terms and credits to economic units, which introduce new technologies with decreased use of natural resources use; easy tax terms for commercial banks and investment funds in the case of their participation in long-term ecological projects financing; establishing realistic prices for natural resources; stimulating of activity directed at the restoring of renewed natural resources; tax imposing for use of contaminated natural resources; introducing the system of state orders for enforcement of environment protection activity from budget means. In developing tax reform policies the main consideration will be given to reducing any disincentives to clean production and abatement technology in order to promote pollution reduction. Enterprise taxation needs to consider allowing accelerated depreciation of clean production technology for tax purposes.

Some measures directed at the enforcement of land conversation policy and stopping the further land degradation is going to be undertaken: enforcement land use restrictions for land, which show severe chemical contamination and causes groundwater contamination; introduction a set of programs for lands which serve as a buffer zones for protection of water resources; developing afforestation and vegetative cover programs for lands which are at slopes and would protect watersheds; establishment of a conservation program for national reserves and wetlands.

The Ministry for Environment Protection intends to improve cooperation with sectoral Ministries, other institutions and non-government organizations in order to develop and completely incorporate environmental impact assessment and environmental audits into the economic development programmes. A special attention is going to be paid to possibility for free public access to environmental information and opportunity to participate in decision-making process.

7.2. Sector Policies

The major environment pollution problem in Moldova appears to be the contamination of surface water and groundwater. Currently there is a necessity to adopt and put into force a realistic system of environmental standards; in particular, there is an urgent need to adopt interim standards for water quality and a strategy of gradually achieving higher levels of drinking water quality.

A large share of population relies on groundwater resources for domestic needs, while a surface water is not a major source of drinking water. There are a lot of sources of water pollution, however, agricultural chemicals are considered a major pollution source. In this connection the efforts will be focused at: minimizing agro-chemical pollution of soil and reducing of agricultural run-off by more efficient application of fertilizers; study the sustainable level of fertilizers application in order to groundwater not to accumulate persistent pollutants; consideration a pollution tax in agro-chemicals use and polluter pays principle; improving the storage of pesticides and fertilizers; identifying the localities with the most polluted drinking water and investment in the supply of good quality water. Basically, there are several options to deal with groundwater pollution, which is considered to be a threat to human health: investment in centralized water supply from alternative sources with good water quality, provision of contained water for drinking purposes and adequate treatment of water used for domestic consumption. The last option is practically difficult because a big share of households with polluted water is supplied from groundwater wells without any treatment, and treatment of chemically polluted water is expensive, but nevertheless the effectiveness and cost the efficiency of individual household treatment facilities need to be investigated. Preventive measures for pollution reduction of groundwater resources should include improvement protection of groundwater sources; implementation of water-protective technologies in livestock farming; reconstruction of the local wastewater treatment plans; proper solid waste management and certain restrictions in fertilizers use.

Mostly introduced in recent years, pollution fees, fines and natural resources user charges inadequately reflect the social cost of environmental degradation and do not provide pollution reduction or more efficient use of natural resources.

Table 7.2. Charges for natural resources use in Moldova (thousand lei)

Category	1994	1995	1996	1997	1998 prognosis	Budget
Water	373	6111	12949	14961	15668	local
Land tax (30 %)	4598	27484	32839	33000	33000	local
Forest	-	198	-61	-	-	local
Soil exploitation	-	67	287	372	419	local
Total	4981	33860	46014	48333	49087	

Fees, fines and charges will be raised and indexed to inflation. At this stage policy is going to be focused on raising user charges for water and wastewater treatment, then on fees and fines for water pollution, especially on persistent pollution of groundwater by nitrates and stable toxins. Currently as a base for fines was taken minimum salary (18 lei, or 3.8 USD).

In 1998 payments for water use have been established at the next level:

- for each 10 m³ of water from surface and underground sources except water used for mineral water production - 10% of minimum salary (1.8 lei, or 0.38 USD)
- for each 10 m³ of water used for mineral water production - 10% from its market value

- for exceeding of allowed volumes of water abstraction payment is imposed to be 10 times as much
- for surface water used for irrigation and fish-farming in the allowed limits payment constitutes 5% of minimum salary (0.9 lei, or 0.19 USD)
- for water used by thermal power station for cooling in the allowed limits payment constitutes 3% of minimum salary (0.54 lei, or 0.15 USD)
- for water use by hydro power stations payment is not imposed

In the nearest future state consortium “Apele Moldovei” jointly with the Ministry of Finances should elaborate order for establishment of water use limits separately for users, which abstract water in volumes i) less 2000 m³; ii) from 2 to 30,000 m³, and iii) more than 30,000 m³.

The calculating of fees for wastewater discharge depends on such parameters as kind of pollution, the concentration of pollutants during discharge and quality of receiving surface water. For wastewater discharge into the waterbodies (rivers, lakes) or aquifers fee for pollution is established in accordance with fixed (allowed) norms of maximum admissible discharges on indexes of pollutants in the project documentation.

Fees for specific indexes of pollutants are realized by water users, who discharge wastewater into the centralized sewerage system. The list of these indexes and maximum admissible concentrations of pollutants are established by the service of exploitation of wastewater treatment plants in agreement with environment protection authorities. *Fee for wastewater discharge in allowed limits* (maximum admissible concentration, maximum admissible discharge) is determined as a product of tax norm and amount of pollutants (in conventional tons). *Fee for wastewater discharge exceeding allowed limits of pollutants* is determined as a product of tax, amount of pollutants (in conventional tons), and coefficient of exceeding of existing concentration of pollutants over normative concentration. Conversion of realistic amounts of pollutants into conventional tons is realized through multiplication of pollutants amount on coefficient of hazard “A” of chemicals. *Fee for wastewater discharge on filtration fields* is determined as a product of tax norm (0.108 lei or 0.023 USD) on total volume of discharge. *Fee for water discharge from fish farms, and for run-off from the territory of enterprises* is imposed only for exceeding of allowed pollution and it is determined as a product of tax norm, coefficient 5 and index of exceeding (in conventional tons).

Table 7.3. Coefficient of hazard “A” for pollutants in wastewater

Determands	Coefficient “ A”
BOD (total)	0.33
suspended solids	0.33
Sulfates	0.01
Chlorides	0.003
N (NH3)	2.56
Detergents	10
oil products	20
Phenols	1000
Iron	10
Copper	100
Zinc	100
Nickel	100
chromium (3)	200
Lead	10
Cadmium	200
Cobalt	100
vismut (3)	2
Arsenic	20
Mercury	2000
Cyanides	20
Formaldehyde	100
oil	20
Nitrates	0.1
Nitrites	50
Ammonia	20
chromium (6)	50
phosphates	5

Table 7.4. Taxes for extra pollutants discharge into surface water

Districts	Coefficient of minimum salary for 1 ton	National currency (Lei)	USD
Briceni	7.20	129.60	27.57
Ocnita	7.50	135	28.72
Edineti	5.70	102.60	21.83
Riscani	5.70	102.60	21.83
Glodeni	5.70	102.60	21.83
Falesti	5.73	103.14	21.94
Ungeni	5.70	102.60	21.83
Nisporeni	8.20	147.60	31.40
Hancesti	8.20	147.60	31.40
Leova	8.20	147.60	31.40
Cantemir	12.6	226.80	48.26
Cahul	12.6	226.80	48.26
Vulcanesti	8.80	158.40	33.70
Chimislia	9.30	167.40	35.62
Comrat	13.80	248.40	52.85
Basarabasca	13.80	248.40	52.85
Chiadir-Lunga	13.80	248.40	52.85
Taraclia	13.80	248.40	52.85

Anti-pollution fees include payments for pollution of aquatic resources and air basin, and for pollution from waste disposals. Discharges within established limits have to be paid at the usual order; all extra discharges have to be paid at the rate 5 higher than tax norm. However, majority of enterprises do not make these payments; within last years the average amount of payment constitutes about 0.1-0.3% of budgetary revenues.

In order to minimize health impact due to bacteriological and industrial pollution of water there were outlined several measures to be undertaken: improvement operations of waste water treatment plants, disconnection of municipal wastewater treatment plants from industrial wastewater system; introduction of closed wastewater system in the industrial enterprises discharging non-degradable pollutants; upgrading industrial wastewater treatment plants; introduction of environmental friendly technologies in industrial sectors; maintenance of treatment efficiency in existing wastewater treatment plants at proper level etc. In order to protect population health and support agricultural development it is supposed to develop regulations on safe applications of agro-chemicals; establish permanent monitoring of agro-chemical residues in agricultural products to convince that they do not pose a health risk to consumers.

Fee for *waste disposals for industrial enterprises keeping wastes on their territory* is determined as a product of tax and volume of wastes in tons. *For wastes accumulated until 1998* fee is not imposed. Fee for waste disposals at the *specialized sites* in the allowed limits is determined as a product of tax norm and volume of waste in tons; *fee for waste in the amount exceeding allowed limits* is imposed to be 5 times as higher.

Table 7.5. Taxes for waste disposal

Class of waste toxicity	Taxes (on coefficient of minimum salary for 1 ton)					
	disposals at the territory of economic enterprises			disposals at the special sites		
	Coeffic.	Lei	USD	Coeffic.	Lei	USD
I class of toxicity	5.8	104.4	22.21	20	360	76.60
II class of toxicity	1.8	32.4	6.9	6	108	22.99
III class of toxicity	0.6	10.8	2.30	2	36	7.66
IY class of toxicity	0.3	5.4	1.49	1	18	3.83
Non-toxic	0.001	0.02	-	0.06	1.8	0.23

The environmental benefit of appropriate municipal solid waste collection, disposal and treatment has not been calculated, however proper solid waste management is considered as a necessity. In this respect the attention will be paid to the financial mechanisms. Also, focus will be placed on quality of waste collection service and management of landfill sites by raising tariffs and developing direct invoice collection; identifying of all locations of illegal dumping and elimination of these dumps; carrying out a special study to develop a national waste management strategy, including economic and environment cost assessment of diverse options for waste disposal, compost plants and incineration; safe storage of toxic pesticides wastes; creating a special sites for long-term storage for industrial wastes, and enforcement regulations on separate disposals of hazardous and industrial wastes. Encouragement will be also given to private sector participation in municipal service like water supply, wastewater management and municipal solid waste management.

Annexes

Annex 1.

Fauna of the Prut River Basin

Fauna of the Prut River Basin

Mammals:

In the Prut River basin inhabit 16 species of mammals; out of them 10 species have been nominated in the "Red List" as a species are endangered or threatened to be extinct.

Erinaceus europaeus L., riverine forests along the Prut River; included in the "Red List" prepared for edition in 1997 as species is endangered

Sorex araneus L., lower Prut, included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Sorex minutus L., included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Aricola terrestris L., plawni of the Prur River

Neomys fodiens Penn, included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Neomys anomalus Carb.

Mustela erminea L., upper Prut; in 1978 was included in the "Red List" as a species threatened to be extinct

Mustela lutreola L., plawni of the Prut River; in the "Red List" edited in 1978 was nominated as a species threatened to be extinct

Felis silvestris Schreb., plawni of the Prut River; in the "Red List" edited in 1978 was nominated as a species is endangered

Myotis dasycneme Boie., district Vulcanesti; included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Myotis daubentoni Kuhl., included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Apodemus agrarius Pall, rare

Apodemus silvaticus L.

Ondatra zibethica L.

Lutra lutra L., in the "Red List" edited in 1978 and prepared for edition in 1997 was nominated as a species threatened to be exist

Rattus norvegicus Berg.

Birds:

In the Prut River basin inhabit 80 species of birds. In the "Red List" 28 species of birds have been nominated as species are endangered or threatened to be extinct

Order Pelecaniformes

Family Pelecanidae

Pelecanus onocrotalus, plawni of the lower Prut; flying on the territory of Moldova within 20-30 days. Included in the Red List" edited in 1978

Phalacrocorax carbo, flying on the territory of Moldova

Order Ciconiiformes

Family Ardeidae

Ixobrychus minutus, waterbodies with reed belts, nest

Botaurus stellaris, waterbodies with reed-belts, flooded lands along the Prut River; included in the "Red List" prepared for edition in 1997 as a species is endangered

Ardea purpurea, nest in the sedge-bed, swampy valleys of the Prut River; included in the "Red List" prepared for edition 1997 as a species is threatened to be extinct

Ardea cinerea, nest, floodplain of the Prut River

Egretta alba, nest rarely, sedge-bed of the lower Prut; in the "Red List" edited in 1978 was nominated as species is endangered

Egretta garzetta, nest rarely, reed-bed of the lower Prut

Ardeola ralloides, rare, nest, reed-bed of the lower Prut; included in the "Red List" in 1978 as a species threatened to be extinct

Family Threskiornithidae

Platalea eucorodia, nest, plawni of the lower Prut River; included in the "Red List" edited in 1979 as a species is endangered

Plegadis falcinellus, rarely nest, flying, reed-bed of the lower Prut

Family Ciconiidae

Ciconia ciconia, nest, riverine urbanized areas; in the "Red List" prepared for edition in 1997 was nominated as a species is endangered

Order Anseriformes

Cygnus olor, flying, partly nest, rarely hibernate; some waterbodies in the southern part of Moldova

Anser anser, nest in the sedge-bed of the Prut River; included in the "Red List" edited in 1978 as a species is threatened to be exist

Anser albifrons, flying; forest lakes in the floodplain of the Prut River; sedge-bed of the lower Prut

Anas platyrhynchos, nest; sedge-bed of the Prut River

Anas querquedula, partly nest, flying

Anas strepera, lake-swampy habitats, meadow lakes in the lower Prut

Anas clypeata, nest rarely, flying, reed-bed of the lower Prut

Netta rufina, rare, nest in the sedge-bed in the lower Prut; in the "Red List" prepared for edition in 1997 was nominated as a species is threatened to be extinct

Authya ferina, not numerous, nest, flying, partly hibernate, middle part of the plawni in the lower Prut, mostly near village Manta

Authya nyroca, reed-bed of the lower Prut, natural lake and swampy places

Authya fuligula, not numerous regular flying; lower Prut

Order Falconiformes

Family Accipitridae

Milvus korschun, riverine forests of the Prut River valleys; included in the " Red List" prepared for edition in 1997 as a species is threatened to be extinct

Accipiter nisus, riverine forests of Prut River valleys; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Circus aeruginosus, sedge-bed of the lower Prut; included in the " Red List" prepared for edition in 1997 as a species is threatened to be extinct

Family Falconidae

Falco cherrug, rare, nest in the riverine forests along the Prut River; in the " Red List" edited in 1978 as a species is endangered.

Hypotriorchis subbuteo, nest, not numerous; Prut River valleys; in the " Red List" prepared for edition in 1997 was nominated as a species is threatened to be extinct

Order Gruiformes

Family Rallidae

Fulica atra, wetlands in the lower Prut

Gallinula chloropus, various types of waterbodies, preferably with stagnant water and riverine vegetation

Porzana porzana, sedge-bed in the lower Prut

Order Charadriiformes

Family Charadriinae

Squatarola squatarola, lower Prut, lake Belevu (district Vulcanesti); in the " Red List" prepared for edition in 1997 was nominated as a species is threatened to be extinct

Vanellus vanellus, nest, wet plains, outskirts of marshes and other waterbodies

Himantopus himantopus, very rare

Tringa stagnatilis, nest in the wetlands of the Prut River basin

Tringa glareola, flying, lakes in the lower Prut

Gallinago gallinago, lakes in the Prut River basin

Haematopus ostralegus, near big lakes in Prut River floodplain; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Family Glareolidae

Glareola nordmanni, meadows along the Prut River, on the banks of lake Belevu (district Vulcanesti); in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Family Laridae

Larus argentatus, nest rarely in the lower Prut

Larus ridibundus, nest in the reed-bed of the lower Prut

Chlidonias leucoptera, nest in the reed-bed of Prut River

Chlidonias nigra, nest

Sterna hirundo, nest at the small islands on the Prut River

Sterna albifrons, included in the " Red List" prepared for edition in 1997 as a species is endangered

Order Columbiformes

Columba palumbus, riverine forests along the Prut River; in the " Red List" prepared for edition in 1997 was nominated as a species is threatened to be extinct

Streptopelia turtur, riverine forests along the Prut River

Order Cuculiformes

Cuculus canorus, sedge-bed of the lower Prut, riverine forests along the Prut River and on the banks of lakes

Order Strigiformes

Bubo bubo, rock banks of the Prut River; in the " Red List" edited in 1978 was nominated as a species is endangered

Strix aluco, riverine forests near the Prut River; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Asio flammeus, rare, prefers open places

Order Coraciiformes

Family Alcedinidae

Alcedo atthis, nest along the banks of the Prut River; included in the " Red List" prepared for edition in 1997 as a species is endangered

Family Coraciidae

Coracias garrulus, riverine forests along the Prut River; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Family Upupidae

Upupa epops, riverine forests along the Prut River; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Order Piciformes

Family Picidae

Jynx torquilla, riverine forests along the Prut River

Order Passeriformes

Family Hirundinidae

Riparia riparia, Prut River banks; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Family Motacillidae

Motacilla alba, southern part of the Prut riverine forests

Anthus pratensis, wetlands in the lower Prut

Family Turdidae

Saxicola rubetra, nest in the valleys of the Prut River

Saxicola torquata, valleys of the Prut River

Luscinia luscinia, riverine forests along the Prut River

Family Paradoxornithidae

Panurus biarmicus, floodplain lakes in the lower Prut; in the " Red List" prepared for edition in 1997 was nominated as a species is endangered

Family Sylviidae

Locustella fluviatili, valleys of the Prut River, on the banks of some lakes

Locustella luscinioides, reed-bed in the lower Prut

Acrocephalus arundinaceus, lake Belevu (district Vulcanesti)

Acrocephalus palustris, nest; wetlands of the lower Prut

Acrocephalus schoenobaenus, nest in the sedge-bed of the Prut River

Hippolais icterina, in the forests of the Prut River valleys

Sylvia borin, wetlands of the middle and lower Prut

Sylvia communis, widely spread, nest in the valleys of the Prut River

Family Remezidae

Remiz pendulinus, floodplain of the lower Prut; in the "Red List" prepared for edition in 1997 was nominated as a species endangered

Family Paridae

Parus palustris, forests in the valleys along the Prut River

Family Certhidae

Certhia familiaris, riverine forests along the Prut River

Family Emberizidae

Emberiza schoeniclus, valleys in the lower Prut

Family Ploceidae

Passer montanus

Family Sturnidae

Sturnus vulgaris, riverine forests along the Prut River

Family Corvidae

Corvus corax, in the "Red List" prepared for edition in 1997 was nominated as a species is endangered

Corvus frugilegus

Corvus monedula

Pica pica

Reptilian:

In the Prut River basin inhabit 7 species of reptilian; out of them 3 species have been nominated as species are endangered or threatened to be extinct

Order Testudines

Family Emydidae

Emys orbicularis L., sedge-bed of the Prut River; in the "Red List" edited in 1978 was nominated as a species is threatened to be extinct

Family Lacertidae

Lacerta agilis, lower Prut

Lacerta taurica, southern part of the Prut River basin, especially district Vulcanesti; included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Family Anguidae

Anguis fragilis, widely spread

Suborder Ophidia

Natrix natrix, widely spread

Natrix tessellata (Laur.)

Coluber jugularis, southern part of Prut River basin; in the "Red List" edited in 1978 and prepared for edition in 1997 was nominated as a species is threatened to be extinct

Amphibian:

In the Prut River basin inhabit 11 species of amphibian; 1 species have been included in the "Red List" as a species is endangered.

Order Caudata

Family Salamandridae

Triturus vulgaris L., widely spread

Order Ecaudata

Family Discoglossidae

Bombina bombina L., included in the "Red List" prepared for edition in 1997 as a species is endangered

Family Pelobatidae

Pelobates fuscus (Laur.), widely spread.

Family Bufonidae

Bufo bufo L., riverine forests along the Prut River

Bufo viridis (Laur.), widely spread

Family Hylidae

Hyla arborea, widely spread in the wetlands

Family Ranidae

Rana ridibunda Pall., widely spread

Rana esculenta., widely spread

Rana dalmatina, wetlands

Rana temporaria, middle part of the Prut River basin

Rana terrestris, valleys of the Prut River

Fish:

In Prut River inhabit 60 species of fish; out of them 2 species have been included in the "Red List" as a species are endangered.

Order Acipenseriformes

Family Acipenseridae

Acipenser ruthenus ruthenus L., downstream of Prut River, included in the "Red List" prepared for edition in 1997 as a species is endangered

Acipenser nudiventris, sometimes comes from the Danube River into the Prut River

Order Salmoniformes

Family Salmonidae

Hucho hucho L., relict species of the Danube River basin

Salmo trutta fario L., upstream of the Prut River, very rare

Salmo gairdneri irideus Gibbons, Prut River, very rare

Family Esocidae

Esox lucius L., widely spread

Umbra krameri, downstream of the Prut River and swampy waterbodies; included in the "Red List" prepared for edition in 1997

Order Cypriniformes

Family Cyprinidae

Rutilus rutilus, downstream of Prut riverbed and its lower tributaries, floodplain waterbodies and lakes near Prut River

Leuciscus leuciscus, Prut River, very rare

Leuciscus cephalus L., Prut riverbed to town Leova and its mountainous tributaries

Leuciscus idus L., Prut riverbed

Scardinius erythrophthalmus L., widely spread

Leucaspis delineatus (Heckel), floodplain waterbodies, lakes, ponds, small tributaries

Tinca tinca L., lakes, floodplain waterbodies of Prut River

Chondrostoma nasus nasus L., Prut riverbed and some tributaries of the Prut River

Chondrostoma nasus borythenicum Berg., Prut riverbed and its mountainous tributaries

Gobio gobio, Prut riverbed and its tributaries

Gobio gobio sarmaticus, Prut River and its tributaries

Gobio uranoscopus frici, mountainous tributaries of the Prut River

Gobio kessleri antipi, only in the downstream of the Prut River

Gobio albiginnatus, comes from the Danube River into the Prut River, rare

Barbus barbus barbus L., riverbed and big tributaries of the Prut River

Barbus barbus borusthenicus, riverbed and some tributaries of the Prut River

Barbus meridionalis petenyi Heckel, mountainous part of the Prut River

Abramis brama danubii, Prut riverbed and some Prut lakes

Abramis sapa sapa (Pallas), Prut riverbed

Blicca bjoerkna L., waterbodies in the Prut River basin

Vimba vimba (Pallas), Prut riverbed; included in the "Red List" prepared for edition in 1997 as a species is threatened to be extinct

Alburnus alburnus alburnus L.

Alburnoides bipunctatus rossicus (Bloch.), mountainous part of Prut riverbed and its tributaries

Rhodeus sericus amarus (Bloch.), slowly running water of the Prut River

Cyprinus carpio carpio L.

Carassius carassius L., waterbodies in the Prut River basin

Carassius auratus gibelio (Bloch.)

Chalcalburnus chalcoides mento (Agassiz), comes from the Danube River into the downstream of the Prut River

Phoxinus phoxinus L., upstream of the Prut River and its mountainous tributaries

Family Cobotodae

Eisgurnus fossilis L., slowly running water of the Prut River

Gobitis taena taena L., widely spread

Gobitis aurata vallahica, middle- and downstream of the Prut riverbed till the Danube River

Gobitis aurata balcanica, mountainous parts of Prut River

Nemachilus barbatulus L., mountainous part of Prut River

Order Siluriformes

Family Siluridae

Silurus glanis L., upstream of the Prut River; floodplain lakes and other waterbodies in the Prut River basin

Order Gariformes

Family Gadidae

Lota lota L., upstream of the Prut River, rare

Order Gasterosteiformes

Family Gasterosteidae

Gasterosteus aculatus aculatus L., downstream of the Prut River

Pungitius platygaster, waterbodies in the Prut River basin and in the tributaries of Prut

Order Perciformes

Family Persidae

Perca fluviatilis L., middle- and downstream of the Prut River, floodplain waterbodies of the Prut River

Lucioperca lucioperca L., Prut riverbed

Aspro zingel L., upstream and middle-stream of the Prut River

Aspro streber streber, endemic species of the Danube basin, upstream of the Prut River and its mountainous tributaries

Acerina cernua L., Prut River lakes, Prut riverbed and its tributaries

Acerina schraester L., upstream of the Prut River and its mountainous tributaries

Family Centrarchidae

Lepomus gibbosus L., downstream of the Prut River

Family Gobidae

Benthophilus stellatus, Danubian lake Cahul

Gobius fluviatilis Pallas, middle- and downstream of the Prut River and its tributaries

Proterorhinus marmoratus, Prut River plawni

Order Petramyzoniformes

Family Petramyzonidae

Lampetra marial Berg., Prut riverbed

Order Scorpaeniformes

Family Cottinae

Cottus gobio L., mountainous part of the Prut River and in the Prut upstream

Order Lampridiformes

Family Syngnathidae

Syngnathus nigrolineatus Eichwald, Prut River lakes

Insects:

Insects play an exceptional role in the supplying of ecosystems stability; they take an active part in decomposition of dead organic substances, in the process of soil generation. They also serve as a food for birds, fish, and mammals. Currently about 10 thousand species of insects are identified in the Moldovian part of the Danube River basin. In 1983 30 species of insects have been nominated as species are threatened to be extinct

Order Ephemeroptera - in the Prut River basin inhabit 13 species, among them the most spread are:

- Ephemera vulgata
- Cloeon dipterum
- Heptagenica sulphurea

Order Odonata. Have been included in the " Red List" prepared for edition in 1997. In the Prut River basin there are 10 species; among them in particular :

- Arigon arigon
- Chalcolestes viridis
- Libellula depressa

Order Orthoptera - Gryllotapa gryllotapa

Order Homoptera

- Family Cicadellidae - altogether 202 species; the most spread are:
 - Cicadella viridis
 - Ledra aurita

Order Hemiptera - altogether 400 species

Family Salfidae. Some representatives have been included in the " Red List" prepared for edition in 1997

- Family Corixidae - 10 species

Order Coleoptera. Some representatives have been included in the "Red List" prepared for edition 1997

Family Carabidae. Altogether more than 1800 species; some representatives have been included in the " Red List" prepared for edition in 1997. One of the most spread is:

- Cicindela lunulata

- Family Haliplidae - 2 species:
 - Peltodytes caestus
 - Haliplus rufficolis

- Family Dytiscidae - 11 species; the most spread are:
 - Dytiscus marginalis
 - D. dimidiatus
 - D. circumflexus
 - D. circumcinctus

- Family Gyrinidae - in the Prut River basin 2 species are widely spread:
 - Gyrinus natator
 - Aulonogyrus concinnus

Family Hydrophilidae - altogether 20 species; some representatives have been included in the " Red List " prepared for edition in 1997; the most spread are next:

- Hydrous atterimus
 - H. piceus

Family Silphidae; have been included in the “ Red Book “, altogether - 11 species

- Family Staphylinidae - 190 species, the most spread is:
 - Paederus riparius

Order Trichoptera - altogether 20 species

Order Lepidoptera . Some representatives have been included in the “ Red List” prepared for edition in 1997; altogether - 1200 species

Family Arctiidae, have been included in the “ Red List”, altogether - 26 species

- Fam. Ichneumonidae - 1000 species

- Fam. Chrysidiae - 70 species

- Fam. Pompilidae - 70 species

- Fam. Ceropalidae - 4 species

- Fam. Sphecidae - 250 species

Order Apidae

- Fam. Colletinae - 23 species

- Fam. Coleticae - 24 species

Fam. Adreninae	- 110 species
Fam. Halectinae	- 110 species
Fam. Mellitninae	- 13 species
Fam. Meganchilinae	- 109 species
Fam. Apinae	- altogether 40 species, out of them <i>Bombus</i> included in the " Red List" prepared for edition in 1997
Fam. Mutilidae	- 21 species
Fam. Eumenidae	- 40 species
Fam. Vespidae	- 10 species
Fam. Formicidae	- altogether 40 species; have been included in the " Red Book" prepared for edition in 1997

Bryozoa play a certain role in biological processes in waterbodies. They participate in biological purification of water and serve as a nutrition for some insects, turbularia, mollusks and some species of fish and birds. In waterbodies of Prut River basin the most spread are **6 species** of Bryozoa:

- *Plumatella fungosa*
- *P. repens*
- *P. emarginata*
- *P. spongiosa*
- *Cristatella mucedo*
- *Fredericella sultana*

In waterbodies of Prut River basin **mollusks** serve as a nutrition for many species of fish. Besides, they are one of the main component of nutrition for more than 20 species of birds in the reed-beds and lakes in the lower Prut. There are next important for ecosystems species of mollusks:

Class Gastropodia

Fam. Neritidae	- <i>Theodoxus fluviatilis</i>
Fam. Viviparidae	- <i>Viviparus contectus</i>
Fam. Valvatidae	- <i>Vavata piscinalis</i>
Fam. Bithyniidae	- <i>Bithynia tentaculata</i>
Fam. Lithoglyphidae	- <i>Lithoglyphus naticoides</i>
Fam. Lymnaeidae	- <i>Lymnaea stagnalis</i>
	- <i>L. palustris</i>
	- <i>L. truncatula</i>
Fam. Bulunidae	- <i>Planorbarius corneus</i>
Fam. Acroloxidae	- <i>Acroloxus lacustris</i>
Fam. Planorbidae	- <i>Planorbis planorbis</i>
	- <i>Anculus fluviatilis</i>

- Anisus vortex
- Aplexa hypnoru
- Fam. Helicidae - Helix pomatina
- Class Bivalvia**
- Family Unionidae - Anodonta cygnea
- Fam. Pisidae - Shpaeriastrum rivicola
- Pisidium amnicum
- Dreissena polymorpha
- Fam. Cardiidae - Hypanis pontica

Type Arthropoda are absolutely essential component of any water and terrestrial ecosystems; without them ecosystems are unstable and temporary. Means, spectra and types of nutrition among Arthropoda are very different. Some of them filter suspended particles and thus play a significant role in biological purification of waterbodies. Owing to gigantic role in decomposition of organic residues of plants and animals Arthropodes could be compared only with heterotrophic bacteria.

Class Crustacea, the most spread is:

- Steptocephanus torvicornis
- Family Sididae - Sida crystallina
- Diaphansoma brachyurum
- Fam. Daphniade - Daphnia magna
- Daphnia longispina
- Daphnia cucullata
- Moina macrospora
- Fam. Bosminidae - Bosmina longirostris
- Fam. Chydoridae - Chydrous sphaericus
- Fam. Leptodoridae - Leptodora kindtii
- Calanipeda aquaedulcis
- Fam. Diaptomidae - Eudiaptomus gracilis

Suborder Cyclopoida ; altogether there are 36 species in the waterbodies in the Prut River basin; they serve as an important source of nutrition for fish; the most spread are next:

- Acanthocyclops vernalis;
- Eucyclops serrulatus
- Cyclops vicinus
- Acanthocyclops vernalis
- Mesocyclops crasus

Suborder Hatpacticoida - altogether 20 species, the most spread are next:

- *Nannopus palastris*
- *Lemnocletodes behningi*
- *Nitocra hibernica*

Suborder Podocopina serves as an important component of fish nutrition

Family Candonidae - 13 species

Subfamily Malacostraca

Order Mysidacea. In aquatic ecosystems Mysidacea represents an interest as a bioindicators of salinity and organic pollution. Besides, they take an active part in the process of biological purification and are the valuable source of nutrition for many species of fish. In Prut River there are 3 species:

- *Limnomysis benedeni*
- *Paramysis lacustris*
- *Katamysis warpachowski*

Order Cumacea

Order Isopoda - *Asellus aquaticus*
- *Jaera sarsi*

Order Amphipoda. There are 7 species in Prut River basin; they are very important as indicators of water pollution and are the component of nutrition for many species of fish, because have a high nutrition value. Also, they play an active role in migration of many physiologically important microelements.

Fam. Gammaridae - *Gammarus kichineffensis*
- *Synurella ambulans*
- *Dikerogammarus haemobaphes*
- *Dikerogammarus villosus*
- *Pontogammarus robustoides*
- *Pontogammarus crasus*
- *Pontogammarus obesus*

Fam. Corophiidae - *Corophium curvispinum*
- *Corophium chelicorne*

Subtype Chelicerata plays a significant role in ecosystems because they eliminate a lot of insects which are harmful for forestry vegetation.

Order Aranei

Fam. Lycosidae - *Dolomedes fimbriatus*
Fam. Agruronetidae - *Agruroneta aquatica*
Fam. Pisauridae - *Dolomedes fimbriatus*

Through absorbing and assimilating of enormous quantities of organic material **Protozoa, Porifera, Coelenterata, Plathelminthes, Nemathelminthes** take an active part in the process of biological purification of waterbodies; in the turn they serve as a nutrition for bigger representatives of fauna. One of most significant factor of their existing is a temperature and pH. In fact, the role of Rototoa (Nemathelminthes) in waterbodies is very big; they participate in process of biological purification in waterbodies; also, they represent significant link in food chain of waterbodies and are the direct consuments of primary production. Roratoria themselves serve as a nutrition for Protozoa, Turbellaria, Nematoda, Cladocera and Copepoda. They play a significant role in the nutrition of various species of fish; especially big role they play in the nutrition of fish larva. Currently in waterbodies of Prut River basin there are representatives of 2 subclasses, 4 orders and 26 families. Among the most spread there are next:

Family Asplnchnidae - Asplanchna priodonta

- A. sieboldi

- A. girodi

- A. brigtwelli

Fam. Lecanidae - altogether 44 species; the most spread is:

- Lecane luna

Fam. Euchlanidae - altogether 18 species; the most spread are:

- Euchlanis dilatata

- E. deflexa

- E. contorta

- E. pyriformes

Fam. Synchaetidae; the most spread are:

- Synchaeta stylata

- S. oblonga

- S. pectinata

Fam. Floscularidae

Fam. Lacinularia

Fam. Conochilidae

Fam. Testudunellidae

Type Nemertini

Type Annelides

Class Polychaeta

Fam. Ampharetidae

Class Oligochaeta

Fam. Aeolosomatidae - Aelosoma hemprichi

Fam. Naididae - Nais elinguis

Fam. Tubificidae - Limnodrilus hoffmeisteri

Annex 2.

Vegetation in the Prut River Basin

Vegetation in the Prut River Basin

1. **Sector Mamaliga-Lipcani.** The forestry and wetland vegetation predominate; the most widespread are the following:

- *Salix alba*
- *S. cinera*,
- *Populus alba* etc.

Also, there is a rare for Moldova vegetation: - *Alnus glutinosa*

- *Impatiens noli-tangere*

2. **Sector Lipcani-Costesti.** Because of Costesti - Stanca reservoir building the structure of natural vegetation has been changed. Currently it is represented mostly by rudemental groups; near confluence of Prut River with small river Vilia there is small sector with forestry vegetation.

3. **Sector Costesti- Pruteni.** Typical vegetation for floodplains and riverine forests.

The most widespread leaf-bearing plants are next:

- *Salix alba*
- *S. cinerea*
- *S. triandra*
- *S. viminalis*
- *S. purpurea*
- *Populus alba*
- *P. nigra*
- *Tamarix ramosissima*
- *Sambucus nigra*
- *Swida sanguinea*
- *Frangula alnus*

Among grassy vegetation predominate:

- *Rubus caesius*
- *Elytrigia repens*
- *Aegopodium podagraria*
- *Calamagrostis epigeios*
- *Quercus robur*
- *Acer campestre*
- *Acer tataricum*
- *Carpinus betulus*
- *Euonymus europaea*
- *Rhamnus cathartica*
- *Lidustrum vulgare*

- Sambucus nigra
- Swida sanguinea
- Viburnum opulus
- Corylus avellana
- Humulus lupulus
- Glechoma hederacea
- Brachypodium silvaticum
- Geum urbanum
- Polygonatum latifolium
- Pulmonaria officinalis
- Stellaria holostea
- Dactylis glomerata
- Asarum europaeum
- Convallaria majalis
- Puccinellia distantis

4. **Sector Pruteni-Nemteni.** Main vegetation is represented by cultivated plants. Among the leaf-bearing plants the most spread is willow. Also, there is a small sector with forestry vegetation mostly represented by oaks.

5. **Sector Nemteni-Cantemir.** Steppe vegetation represented by the next grasslands:

- Thymetum (marshallianus) festucosum (valesicae)
- Bothriochloetum (ischaemi) festucosum (valesiaca)
- Bromopsidetum (riparae) artemisiosum (australicae)
- Artemisietum (austriaceae) bromopsidosum (ripariae)
- Bromopsidetum (riparae) thymosum (marshalliani)
- Bothriochloetum (ischaemi) thymosum (marshalliani)

Among aquatic vegetation the most spread are next:

- Stratoides aloides
- Sagittaria sagittifolia
- Ceratophyllum demestrum
- C.submersum
- Lemna minor
- Polygonum amphibium

Also, widely spread are next plants:

- Alisma plantago-aquatica
- Typha anguvis
- Phragmites australis
- Fraxinus excelsior

- *Ulmus laevis*
- *Acer negundo*

6. Sector Cantemir-Danube. Among the most widespread vegetation there are the following species of trees and shrubs:

- *Salix cinerea*
- *S. triandra*
- *S. viminalis*
- *Tamarix ramosissima*
- *Morus alba*
- *M. nigra*
- *Sambucus nigra*
- *Swida sanguinea*
- *Rosa spinosa*
- *Rubus caesius*
- *Elytrigia repens*
- *Polygonum hydropiper*
- *Carex riparea*
- *Ranunculus repens*
- *Glechoma hederaceae*
- *Iris pseudacorus*
- *Ropira sylvestris*
- *Symphytum tauricum*
- *Alopecurus pratensis*
- *Lisimachia nummularia*
- *Galium aparine*
- *G. molugo*
- *Solanum dulcamara*
- *Typha angustifolia*

This vegetation is mostly met in the next grasslands:

- *Salicetum (albae) agrostidosum (stoloniferae)*
- *S. caricosum (riparae)*
- *S. elytrigiosum (repentis)*
- *S. rubosum (caesii)*
- *S. phragmitosum (austratis)*
- *S. glycerosum (maximae)*

Grassy vegetation are grouped into the following associations:

- Elytrigietum (repentis) agrostidosum (stoloniferae)
- E. eleocharosum (palustris)
- E. cynodonosum (dactyloni)
- E. potentillosum (repentis)
- Agrostidetum (stoloniferae) eleocharosum (palustris)
- A. eleocharosum (acicularis)
- A. juncosum (gerardi)
- A. glyceriosum (maximae)
- A. ranunculosum (repentis)
- A. potentillosum (repentis)
- A. roriposum (sylvestris)
- Typhetum (angustifolia) glyceriosum (maximae)
- T. scirposum (tabernaemontani)
- T. phramitosum (australis)
- T. agrostidosum (stoloniferae)
- Phragmitetum (australis) polygonosum (hydropiper)

Among aquatic vegetation the most spread are the following species:

- Polygonum hydropiper
- Veronica anagalis aquatica
- Eleocharis palustris
- Rumex silvestris
- Capsella-bursa pastoris
- Xantum spinosa
- Galium apparine
- Chelidominum majus
- Agrostis atolonifera
- Eleocharis acicularis
- Juncus gerardi
- Vitis silvestris
- Humulus lupulus

Annex 3.

Vegetation in the Yalpugh River Basin

Vegetation in the Yalpugh river basin

The most widespread are the following mezophite species:

- *Phragmites australis*
- *Typha angustifolia*
- *T. latifolia*
- *Bolboschoenus maritimus*
- *Butomus umbrellatus*
- *Alisma plantago-aquaticva*
- *Trifolium repens*
- *Polygonum hydropiper*
- *Scirpus tabernaemontani*
- *Echinochloa crus-galli*

Among the grassy vegetation include:

- *Salicornia europea*
- *Tripolium vulgare*
- *Spergularia maritima*
- *Puccinellia distans*
- *Juncus gerardi*
- *Cynodon dactulon*
- *Lolium perenni*
- *Polygonum novoascani*
- *Bupleurum tenuissimum*
- *Atriplex litoralis*
- *Trifolium fragiferum*
- *T. repens*
- *T. vulgare*
- *Cichorium intybus*
- *Elytrigia repens*
- *Agrostis stolonifera*
- *Polyfonium aviculare*

The following grasslands have been described:

- *Puccinellietum (distantis)*

- Cynodonetum (dactyloni) elytrigiosum (repentis)
- C. juncosum (gerardi)
- Juncetum (gerardi) elytrigiosum (repntis)
- Atriplexidetum (litoralis) spergulariosum (martimi)
- Tamaricetum (ramosissimae) elytrigiosum (repentis)
- T. spergulariosum (maritimae)

Annex 4.

Vegetation in the Cahul River Basin

Vegetation in the Cahul River Basin

The most widespread species in the Cahul River valley are next:

- *Agronis stolonifera*
- *Juncus gerardi*
- *Puccinellia distans*
- *Cynodon dactylon*
- *Artemisia austriaca*
- *Potentilla arenaria*
- *Lolium perenne*

In the natural conditions plant species predominately are found in the following communities:

- *Lolietum (perennis) cynodonietosum (dactyloni)*
- *Cynodon dactylon (monodom.)*
- *Cynonetum (dactyloni) euphorbiosum (seguieriannae)*
- *C. urticosum (dioicae)*
- *C. lolietosum (perennis)*

Predominate grasslands:

- *Phragmitetum (australis) typhosum (angustifoliae)*
- *Agrostidetum (stoloniferae) trifoliosum (repentis)*
- *Taraxacum officinale*
- *Plantago angustifolia*
- *Agrostis stolonifera*
- *Bidens tripartita*
- *Butomus umbrellatis*
- *Veronica anagalloides*
- *Eleocharis palustris*
- *Polygonum hydropiper*
- *Iris pseudacorus*
- *Scirpus lacustris*
- *S. tabernaemontani*

Among steppe grasslands the most widespread are next:

- *Bothriochloa ischaemum*
- *Festuca valesiaca*
- *Thymus marschallianus*
- *Artemisia santonica*

- *Teucrium polium*
- *Potentilla arenaria*
- *Thymus marschallianus*
- *Kochia prostrata*, which could be grouped into the next associations:
- Bothriochloetum (*ischaemi*) thymosum (*marshalliana*)
- *B. festucosum* (*valesiaca*)
- *B. (ischaemi) artemisiosum* (*austriaca*)
- *B. potentilliosum* (*arenariae*)
- *B. thymosum* (*marschalliani*)
- *B. teucriosum* (*polium+chamaedris*)
- Festucetum (*valesiaca*) bothriochlosum (*ischaemi*)
- *F. potentillosum* (*arenariae*)
- Thymetum (*marshalliani*) bothriochloosum (*ischaemi*)

Annex 5.

Grasslands in the Lower Part of the Danube River Basin to Be Protected

Grasslands in the Lower Part of the Danube River Basin to Be Protected

Danube river Delta:

- Caricetum (acutiformis) thelypteridosum (palustris)
- Mariscetum (hamulosi) juncosum (minutuli)
- Typhetum (laxmanii) cladiosum (marisci)
- T. juncosum (litoralis)
- Trapetum potamogetosum (lucentis)

Beleu lake, Danube River Delta:

- Eleocharitetum (acicularis) cyperosum (glomerati)

Beleu Lake, Yalpugh Lake:

- Nymphaetum (albae) potamogetosum (natantis)

Beleu Lake, Manta Lakes, Yalpugh Lake, Cahul Lake, Danube River Delta:

- Salviniatum (natanis) purum
- Nymphaetum purum

Manta Lakes, Danube River Delta:

- Potamagetonetum (graminei) najadosum (majoris)

Cahul Lake, Danube River Delta:

- Salviniatum lemnosum (gobbae)

Yalpugh Lake:

- Scirpetum (litoralis) purum

Manta Lakes:

- Thelypterietum (palustris) toruliniosum (feraxis)

Yalpugh Lake, Danube River Delta:

- Stratiotetum (aloiditis) Hydroshariosum (morus-ranae)

Cahul Lake:

- Trapetum (natantis) amollossum (caroliniana)

Cahul Lake, Beleu Lake, Danube River Delta:

- Trapetum nymphoidosum (peltatae)

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Part B

Financing Mechanisms

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1. Summary

Achievements in environmental protection depend on the financial resources that can be allocated. The Republic of Moldova suffers from serious shortage of financial means. There are three sources currently used to finance environmental expenditure: the State Budget, funds accumulated in environmental funds and enterprises' resources. Moldova has a comprehensive corpus of environmental laws and regulations, which is being supplemented, regularly, by the addition of new laws. But translating legal requirements into effective action pushes off the following serious problems: ineffective penalties and weak enforcement, content of the laws and conflict between laws.

The environmental funds might develop into a substantial source of funds. The draft laws on environmental charges provide a basis for such a Government decision, but considerable problems exist with the current management of the funds. The funds are scattered and expenditure is not focussed. A transparent balance of the local and national funds could be established, and the administration of the funds better streamlined and coordinated. So, sources of finance and purposes of the national and environmental funds should be reconsidered between all levels of administration involved and clearly delimited. It is necessary to create a unit for the management of environmental funds within DEP. It should carry out the operations of the national funds and describe procedure for local staff to run operations of local funds.

Initially, a relatively large number of projects could best be funded through the National Environmental Fund, which will require adequate contributions.

When the skills and capacity of local funds will be upgraded to the necessary level, more decision-making on project financing should be delegated to the administrative council of local funds. Initially, NEF would need to concentrate on project management, requiring clear rules on how projects should be documented in application forms.

Moldova is sustaining a considerable effort to plan and design an infrastructure that corresponds to the needs of a market economy. The process is in a difficult condition, as the economy is going through transition and recession, and country tries to strengthen its independence. The task being truly enormous, it has to proceed in stages. The current objective of overriding importance to water resource management is covering the maintenance and operating costs of water supply facilities.

In general, to improve the situation concerning water resources, the following issues need to be taken into consideration:

- the overall poor quality of water resources
- the supply of drinking water to the rural population in accordance with established standards
- the installation of sewers and wastewater treatment plants also in industry
- cost recovery, tariffs, and sustainability of water resource development
- strengthening of institutional capacity in efficient management techniques
- watershed protection
- increasing the qualification of water management staff especially within local authorities.

A first major problem, of which the Moldavian authorities are very aware, centers on assessment of water's true production costs. It is an absolute priority in the light of national water resource management objectives. Water abstraction, treatment and supply, wastewater collection and sewer systems, wastewater treatment plants and their final discharge all give rise to costs, which need to be properly assessed. A very big effort should be made to recover the cost of operating and maintaining water facilities. As energy costs increase, the capacity of water users to pay for water will be further eroded. This situation requires the formulation of an adequate tariff policy at the

national level. So, the assessment of the full costs of water abstraction and supply, wastewater collection, treatment and discharge should be seen as a priority for Moldova's water resource management. It is essential for reformulating the national water tariff policy. The assessment should include all economic costs, be they related to the operation of all relevant technical installations, as their replacement. These requirements are stipulated in the Strategy for Using Aquatic Resources which was prepared by «Apele Moldovei» and World Bank and in the project of the European Bank for ensuring the water supply and water network of the whole city of Chisinau.

The allocation of funds to different parts of the water system does not appear to be optimal. The blurred delineation between authorities and agencies involved in the control and management of water resources reduces the efficiency of the system as a whole. Solving this administrative deficiency appears to require the elevation of the status of the environmental administration, before operational cooperation routines can be developed.

To provide the purposes of water resources development Moldova participates in a number of international agreements. The Government of Moldova together with foreign partners including the World Bank prepared a draft public investment programme. It is designed to seek both internal and external sources of finance. Five projects included in the programme relate to the improvement of water-supply systems for a number of major towns and neighboring villages. These projects are:

- Chok-Maitan water intake in Comrat, caused by a deficit in water-supply and poor water quality level
- Water supply system for the town of Kainar, concerning the replacement of the existing sources of water as they don't meet the required standards for drinking water
- Water supply systems for the cities of Ungheni, Kalarash and Bucovesti relate to satisfying the needs in water resources for that region.
- Water supply for Leova Region project has the objective to improve the water supply to 37 settlements, which is currently not fit for human consumption.
- Water supply for the town of Telenesti and neighboring village: the proposed water supply system will provide clean drinking water from the Nistru-Soroca-Balti supply network replacing the current ground water supply.

2. Data Collection and Analysis

2.1. Legal Basis

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

Table 2.1. The legislative framework for water management contains the following laws

N/o	Title	Source where copy can be obtain	Level of relevance/ application (central, regional, municipal, etc.	Authorities responsible for execution, control etc	Main subjects, contents, particularities, etc.
1.	Law on Environment Protection (1993)	“Monitorul Oficial”	central	Parliament, President, Government, Local authorities, Department for Environment Protection, The State Ecological Inspectorate	Extrabudgetary Ecological Fund, Taxes on the use of soil, water, mineral resources and forest
2.	Water Code (1993)	“Monitorul Oficial”	central	Government, Local authorities, Authorities for environment protection, Specialized state authorities.	Water Utilization, Water Protection.
3.	Subterranean Code (1993)	“Monitorul Oficial”	central	Government, Local authorities, Department for Environment Protection, Department for Standards, Metrology and Technical Control.	Economic incentives, Terms of usage, Subterranean Protection.
4.	Law on Ecological Expert Evaluation and the Evaluation of Impact on the Environment (1996)	“Monitorul Oficial”	central	Central authority for environment, Specialized state authorities, Public organizations for environment	Financing of the Ecological Expertizing Activity
5.	Law on Natural Resources (1997)	“Monitorul Oficial”	central	Government, Local authorities, Specialized state authorities, Public organizations for environment and Natural Resources.	Management of Natural Resources, Investment Policy, Charges for Natural Resources.
6.	Governmental Decision on confirmation of the Complex Scheme of Water Supply and Wastewater Discharge up to 2005 (1994).	“Monitorul Oficial”	central	Interested ministries and departments, Independent body «Apele Moldovei», Geologic Association of Moldova (AgeoM), The Hydrometeorological Service.	The instruction of the elaboration and approbation of the Complex Scheme of Water Supply and Wastewater Discharge.

2.1.2. Assessment of Main Deficiencies and Needs for Improvement

Moldova has a comprehensive corpus of environmental laws and regulations, which is being supplemented, regularly, by the addition of new laws. There is a general consensus that the existing body of laws is a sufficient base for effective environmental action to manage the serious environmental difficulties faced by Moldova. There are four major problems, however, in translating legal requirements into effective action. These are:

- Weak enforcement;
- Ineffective penalties;
- Structure/content of the laws; and
- Conflict between laws.

To a great extent the first two problems are a phenomenon, probably temporary, of the economic and political transition, which is under way. The last two difficulties are of greater significance because they are a product of structural weakness in both the modes of law making and coordination within and between ministries and departments.

Environmental legislation is oriented toward allocating functions and tasks to different organizations. The structures of these organizations are defined and their functions (areas of responsibility, tasks, etc.) established, with varying degrees of precision, as definitions of key terms are not always a feature of laws. Generally, the procedural element is weak or, indeed, absent. In some cases, procedures are contained in regulations or normative instructions, but this does not always occur. The lack of procedural clarity and definitions makes implementation difficult because individual organizations are not clear about the nature of their relationship with other similar entities (on issues such as precedence, timing, dispute resolution, etc.). This, in turn, leads to confusion and opens the door to “conflict” between differing legal interpretations. The overall result can be that needed activities are not implemented effectively and efficiently and government credibility, within the wider population, suffers. Moldavian specialists are aware that laws are contradictory. A local review of legislation pertaining to “underground” resources (minerals, water, etc.) has shown numerous contradictions between the different laws.

Conflict between laws also arises from the nature of drafting and consultation activities in the legislative process. Internal and external consultation procedures are poorly developed. Although there is a stage in the legislative process for checking compatibility between laws, the time allocated for this activity is very short (a few weeks). It is clear that the pressures of work and time are not conducive to careful consideration of issues of compatibility.

Even when conflicts between laws are identified, there is no clear procedure in place for resolving them. It is not common practice to identify specific amendments to other laws when proposed laws are sent to Parliament, or to link these together for scrutiny by Parliament. Often laws contain a statement such as, “... all other normative acts on this subject shall apply so long as they do not conflict with this law.”

The Law on Ecological Expert Evaluation and the Evaluation of Impact on the Environment provides an example of this difficulty. Article 27 states that the Government, “... will make its own normative acts comply with this law”. As of early May 1997 this had not been accomplished. Such statements of intent, unless supplemented by the identification of specific amendments, only succeed in increasing the potential for confusion and conflict.

The problems faced by Moldova in a time of economic transition and gradual incorporation into the international legal framework for environmental management have posed considerable difficulties for the Department for Environmental Protection (DEP) and other organizations. They are faced with rapid changes and the need to cope with these changes often requires an appropriate legal

framework. Unfortunately, the speed of change, and the identification of specific problems, has resulted in a “fire-fighting” approach. There is a discernible tendency to deal with problems by drafting, quickly, a targeted law or laws. Passing laws has to some extent been a priority to the detriment of successful implementation of activities to deal with the problems. The speed, at which new laws and amendments to existing laws are produced, is astonishing. Unfortunately, “quantity” is being achieved at the expense of “quality”.

2.2. National Policy and Strategy for Funding of Water Sector Programmes and Projects

Accompanying the afore-mentioned legal structure is a variety of policy documents, which have been given official status and are implemented following government and/or parliamentary decisions. Moldova now has a comprehensive legal and policy framework for environmental management.

The significant policy documents are:

- the National Environmental Action Plan 1995-1998 (although mostly focused on identifying specific projects for implementation and requiring international financial assistance), 1995 (NEAP);
- the National Strategic Action Plan for Environmental Protection 1995-2020, 1995 (NSA-PEP);
- Territorial Scheme for Environmental Protection and Rational Use of Natural Resources of the Republic of Moldova 1991-2010, 1991; and
- The Comprehensive Long-Term Programme for Environmental Protection and Rational Use of Natural Resources in the Republic of Moldova 1987-2005, 1987.

It is understood that the documents originating from the pre-independence period are still in force. There is considerable overlap between these documents, particularly at the broad scale of national policy objectives and in terms of priorities. They have shaped current government policies, which can be summarized as follows:

- integrating environmental considerations into the economic reform process and improving the procedures for licensing and control of individual development projects;
- strengthening institutional capacities for environmental management;
- introducing economic incentives for pollution control;
- encouraging the private sector, the public and non-governmental organizations (NGOs) to play an active role in improving environmental conditions;
- decentralizing environmental management functions; and
- participating fully in international activities and harmonizing legislation with international laws and conventions.

Although all these policy documents are in force, not all have equal influence in current government activities. At present, the National Environmental Action Plan is the most influential as its recommended priority actions carry the authority of both the Government and the World Bank and are the most likely to be supported by the international donor community.

This Plan was approved by the Government on 7 June 1996 and Government Decision 302 requires ministries and departments to use this Plan to guide their actions. DEP coordinates its implementation, reports on progress to the Government and created a Division of Environmental Strategies and Programmes to:

- organize and coordinate the Plan's implementation; and
- coordinate international technical assistance for environmental protection.

The first task is difficult to achieve because the Plan is not an integrated programme of linked and phased activities, which can be taken, easily, and put into operation by ministries and departments within their respective sectors. It lacks specific targeted policies and recommendations, which can be meshed with current sectoral actions. Also, financial and institutional constraints make any kind of implementation impossible without external assistance.

A Project Management Office was established in DEP to assist Plan implementation by identifying and preparing projects for donor consideration and to help with resulting project implementation. As of March 1997 six projects had been selected for possible donor funding. Unfortunately, the funding for this Office has not been renewed. However, a recently approved TACIS project may provide valuable assistance to revive NEAP implementation. Another project on "Building capacity for the implementation of the NEAP in Moldova" was recently approved by United Nations Development Program (UNDP). It aims at assisting DEP by improving its institutional capacity, supporting the development of local environmental action plans and mechanisms for their implementation: it also aims at identifying and promoting projects fitting with the NEAP recommendations.

The Plan divides its recommended actions between short-term and long-term. Short-term actions need finance, but can be implemented by existing institutions. Long-term actions need the creation of appropriate institutional capacity before implementation. To enable long-term actions to be implemented, institutional strengthening activities are expected to occur, while the short-term actions are being implemented.

The main Plan recommendations for the period 1996-1999 are as follows:

- preparation of a water resource strategy and master plan (with identification of "hot spots" and specific watershed management studies);
- preparation of a water supply investment programme to deal with the identified "hot spots" and to improve maintenance and delivery of potable water to urban areas;
- improved agricultural extension services to tackle erosion, increase efficiency of pesticide and fertilizer application;
- improved forest management and protection against uncontrolled exploitation;
- introduction of a strategy to control air pollution by a mix of controls and economic incentives; and
- strengthening DEP by enhancing its status in the government hierarchy (by making it a ministry) and increasing the financial, administrative and technical ability of its staff to implement its mandate and deliver its services.

These priorities form the context, within which the six projects have been identified and prepared. Examples are:

- institutional capacity building for DEP;
- agricultural and water quality study;
- Telenesti water supply system improvements; and
- Biogas project.

The elements of a policy framework are in place, but two major problems remain. First, policy appears to develop somewhat incrementally and haphazardly, based on a variety of documents of varying status and provenance. Second, implementation is ineffective because of Moldova's financial problems, the relatively weak position of DEP and the limited environmental awareness and expertise in sectoral ministries.

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

2.3.1. Relevant Public Funding Sources and Instruments in Use

The Republic of Moldova suffers from a serious shortage of financial means. There are two public sources currently used to finance environmental expenditures: the State Budget and funds accumulated in the National Environmental Fund.

National Environmental Fund

(1) Role, Structure and Responsibilities

The Interim Regulation on the Establishment and Use of Environmental Funds (1990) marked the beginning of environmental funds in Moldova. The charges and fines were designed to be a source of revenue for the funds. The Regulation was drafted in such a way that it could be used to establish local funds. Article 3 specified the sources of income and Article 4 the use of the collected moneys. The National Environmental Fund (NEF) took 25 per cent of the revenues of local environmental funds to solve environmental problems at the level of the Republic. Two per cent of local environmental funds' revenues had to be transferred to NEF for emergencies. Five per cent of the local funds' revenue (but not from NEF) had to be transferred directly to the USSR State Environmental Fund. Later in 1991, the methodological instructions establishing AP and AAP limits were drawn up and some local funds were created in cities like Chisinau and Tiraspol. However, the environmental funds were in fact no more than a separate sub-account in the local authorities' books with annual pro-forma statements of expenditure stemming from the local authority's five-year development plans.

The Law on Environmental Protection (1993) amended the environmental funds. It concentrated on a new institutional set-up and pretended to replace the 1990 Regulation (which had been temporary). However, in accordance with the law of basic budget principles taxes on the use of natural resources are one of the local budget income sources. This law and some others, concerning the activity of ecological funds came into collision and thereby didn't create a well-established legal status for ecological funds. Therefore, the Chisinau environmental fund, which under the previous law was managed by the Environmental Economics Section, did not follow the 1993 Law.

At present the sources of environmental funds formation were specified by the Law on Charges for Environmental Pollution and by the introduced changes and updates to the Law on Environmental Protection. The last one stipulate the establishment of the local environmental funds under the regional agencies of the Department for Environmental Protection (12 local environmental funds) and a National Environmental Fund under the control of the Department for Environmental Protection (DEP).

Here is an extract from above-mentioned Law: "Environmental funds - National Ecological Fund (under the Department for Environmental Protection) and local environmental funds (under the regional agencies of the Department for Environmental Protection) – are established for the pur-

pose of accumulation of the additional financial resources for protecting the environment and for the recovery of the ecological systems. Not less than 70 percent of the local environmental funds resources are used for prevention and control of the environmental pollution, the recovery of its condition and the elimination of the pollution aftermath.”

In the actual legislation and in new legislative acts the environmental funds, including the National Ecological Fund don't possess the legal status of the juridical person.

Local environmental funds were under the supervision of the local authorities, hereafter they will be under the supervision of the regional agencies of the Department for Environmental Protection and the National Environmental Fund – under the Department for Environmental Protection.

To manage the local funds the administrative boards were established. They consist of the local authority executive (the administrative board chairman), the chief of the regional agency of the Department for Environmental Protection and the representative of the local Center for Scientific and Applied Hygiene and Epidemiology.

The control of the NEF is made by the Administrative board consisting of the General Director of the Department for Environmental Protection (the Administrative board chairman), a permanent representative of the Government, assigned by the Prime-Minister and a permanent representative of the Parliament.

However, the activity of the administrative board isn't regulated by legislative and normative documents. Practically, the decision of using the NEF resources is taken only by the Chairman of the Board.

In 1996, DEP drafted a law on environmental funds and a law on ecological taxes, partly to remove uncertainties created by the Law on Environmental Protection. In May 1997, the drafts with proposals to amend the Law on Environmental Protection accordingly were submitted to the Government for debate. The draft law on environmental funds basically repeats the statements from the Law on Environmental Protection concerning administrative boards. However, it clearly states that environmental funds should be created within the Regional Environmental Departments, and not within municipal authorities. The sources of income remain virtually unchanged for local funds, though NEF would obtain new sources of revenue (charges from vehicles for air pollution, fines for damaging fish populations, interest from short-term balances on the current account). The draft proposes that each environmental fund should report quarterly to its administrative board, which in turn would report to NEF. The Administrative Council of NEF would report to the Government (annually) and to the Department for Statistics (quarterly).

For the purpose of the resources accumulation, which will be used in exceptional cases and current expenditures a reserve fund will be established consisting of 10% from annual resources volume of the NEF and the local environmental funds. The draft law on ecological taxes is clearly an attempt to iron out the contradictions between the Law on Environmental Protection and the Law on the State Budget. It also calls for a review of the methodological instruction for establishing standards (AP and AAP limits).

(2) Financial Management and Administration

The Direction of the Accounting and Finance of the Environmental Protection Department is keeping record of NEF resources. On-line data about incoming resources and their utilization are supplied to the Strategies and Programs Division.

In the Republic doesn't exist a single legislative base concerning the collection of the charges for environmental pollution as a basic source of the funds formation. The decisions of introducing the charges were taken on the account of the local authorities. And, basically, this decision was rejected. Actually, such charges exist only in the Chisinau area.

The procedure of resources entry in the local environmental funds is following: in the first place the resources are accumulated on the accounts of the regional environmental agencies (regional agencies of the Department for Environmental Protection), then they are divided and transferred in the following way:

- 63% to the local environmental funds,
- 32% to the NEF
- 5% are left at the disposal of the regional environmental agency.

The only exception is the Chisinau Environmental Fund, which formation resources are the charges for environmental pollution received from enterprises and organizations performing any economical activity, regardless of the ownership form and legal status. 32% of these resources are transferred to NEF. The accumulation and the use of the Chisinau Environmental Fund’s resources are made by economical and ecological department of the Chisinau city executive board. The maintenance of this department is financed from the city environmental fund. The resources of the other local environmental funds are insignificant, as they are composed only from different penalties. The NEF is formed only on the account of the resources transferred from local environmental funds (32%). There are no resources obtained through other channels.

The enterprises have the right not to make payments to environmental funds in the condition that these resources will be invested in environmental protection.

The Law on Environmental Protection determined that environmental funds could finance the following activities:

- a. development and implementation of local and national programmes for environmental and biodiversity protection;
- b. ecological restoration of sites and small rivers;
- c. building, reconstruction and renovation of environmental protection facilities;
- d. purchasing technical devices, equipment, instruments and chemicals for the laboratories of DEP and its subordinating units;
- e. R&D at the request of DEP and the Environmental Quality Council;
- f. training of environmental staff;
- g. information and education, public relations;
- h. support of international cooperation on the environment;
- i. providing grants or bonuses to the entities or individuals that invest in or otherwise contribute to environmental improvement (limited to 5 per cent of eco-fund revenues).

In 1995, NEF received 193,200 Lei and spent 188,400 Lei as follows:

Table 2.3.1.(1) NEF expenditures in 1995

	in million Lei	as % of total
Ecological information and training	49.0	26.0
Laboratory equipment	55.7	29.6
International cooperation	48.6	25.8
Research and development	16.4	8.7
Other	18.7	9.9

Source: DEP Environmental Strategies and Programmes Division

Note: 100 USD = 449 MDL

This is only 0.3% of the total environmental expenditure (Table 2.3.1.(2)). The following Table shows the pollution abatement and control expenditures in Moldova, in 1995.

A rough comparison between pollution abatement and control expenditures in Moldova and in OECD countries, suggests a comparable but slightly lower level in Moldova in 1995 (1.15% of GDP versus 1.3-2.0% in OECD member countries). The dynamic of environmental expenditure in the country could be seen in conjunction with the figures of Table 2.6., where environmental investments were recalculated in real terms with the help of the overall price index of capital investment.

The data demonstrate that total environmental investments in real terms are shrinking. However, the reason behind this drop in Moldova differs from that in most OECD member countries.

Table 2.3.1.(2) Environmental expenditures, 1995

	in million Lei (current prices)	as % of total
Total expenditure	73.20	100.0
Current expenditures	41.10	56.1
Expenditures to repair installations	5.00	6.8
Expenditures for forestry	15.40	21.0
Capital investment	11.65	15.9
Capital investment in "Moldsilva"	0.05	0.1

Source: Department for Statistics.

In the OECD region, the need to adapt polluting equipment to new environmental requirements boosted investments earlier this decade. In Moldova, the expenditure decreased because of a lack of funds. Capital investment decreased more than halved in 1996.

Although in 1995, 73.2 million Lei (current prices) were spent on environmental protection, capital investment accounted for only 16 per cent. DEP expects capital investment in environmental protection to increase in 1997. However, judging from the Ministry of Finance's view on the budget deficit and debt administration, it seems unrealistic to expect funds to come from the budget. The breakdown of capital investment was available only for 1995 (see Table 2.3.1.(3) below). It shows that the State budget was the main contributor to the funding of environmental expenditures. Enterprises were the second largest investor in the environment.

Table 2.3.1(3) Capital investment in the environment¹ and rational use of natural resources, 1990-1996² (Amelioration excluded, current prices unless otherwise specified, thousand Lei)

	1990	1991	1992	1993	1994	1995	1996
Total (million Lei, current prices)	30.2	49.0	337.4	2916.7	12450.6	11651.4	6184.3
of which:							
water	14.3	24.7	220.9	1279.8	5803.8	6715.4	1826.7
soil	11.1	19.8	98.9	1488.1	6249.2	4471.7	4074.8
air	3.8	1.1	7.6	3.1	-	457.3	271.2
forest, flora and fauna	1.0	1.3	9.3	-	-	-	-
wastes	-	2.1	0.7	145.7	397.6	7.0	11.6
share (%):							
water	47.4	50.4	65.5	43.9	46.6	57.6	29.5
soil	36.8	40.4	29.3	51.0	50.2	38.4	65.9
air	12.6	2.2	2.3	0.1	-	3.9	4.4
forest, flora and fauna	3.3	2.7	2.8	-	-	-	-
wastes	-	4.3	0.2	5.0	3.2	0.1	0.2
price inflation on capital investment ³	-	-	2491	1131	852	141	126
Total (million Lei, at constant 1991 prices)	-	49.0	13.5	10.4	5.2	3.4	1.5

Sources: Statistical Department of Moldova

Note: ¹ Amelioration excluded.

² Data 1992-1996 exclude left bank of the river Nistru and the city Bender.

³ As per cent from previous year.

Table 2.3.1.(4) Total incomes and expenditures of the environmental funds (thousand MDL)

	1993	1994	1995	1996
Total incomes, including local environmental funds	206.8	304.2	938.1	1515.8
Total expenditures	186	239	798	1370

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(5) The incomes of environmental funds (thousand MDL)

	1993	1994	1995	1996
Allotment from the (state/local) budget				
Total charges for environmental pollution, including :	188.4	249.7	826.4	1405.8
charges for the air pollution	133.5	105.1	307.1	579.6
charges for the sewage	43.3	90.2	397.5	776.6
charges for the wastes	11.6	54.4	121.8	49.6
tax on the use of the land				
tax on the use of mineral resources				
other charges				
penalty charges for the air pollution	0.9	8.8	25.9	31.3
penalty charges for the use of the water				
penalty charges for the sewage discharges	4.3	7.1	18.7	11.7
penalty charges for the wastes				
penalty charges for the use of the soil/land	4.7	8.4	9.9	10.5
penalty charges for the use of mineral resources				
other penalty charges for breaking the flora and fauna legislation	8.5	30.2	57.2	56.5
charges/taxes on the goods				
import tariffs/dues				
Total amount	206.8	304.2	938.1	1515.8

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(6) The expenditures of the funds by kinds of payment (thousand IMDL)

	1993	1994	1995	1996
Grants	186	239	798	1370
Loans without interest				
Soft loans				
Investment in environmental protection measures				
The other				
Total expenditures	186	239	798	1370

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(7) Expenditures of the fund by the segments of the environment (thousand MDL)

	1993	1994	1995	1996
AIR total				350
including :				
energetic sector				
industry				350
transport				
other expenditures connected with air pollution				
WATER total				340
including :				
water-supply	-	-	-	
sewage treatment				243
other expenses connected with water protection and supply	-	-	-	97
Wastes total		35	27	-
including :				
reutilization and recycling	-	-	-	
burning and another kinds of processing	-	35	27	-
	-			
LAND/SOIL PROTECTION		-	40	-
ENVIRONMENTAL PROTECTION / PRESERVATION	120	37	365	154
EDUCATION on the questions of environmental protection and public spirit	22	85	140	168
MONITORING and informational systems	44	60	56	59
OTHER	-	22	170	299
TOTAL EXPENDITURES	186	293	798	1370

Source: DEP Environmental Strategies and Programmes Division

Table 2.1.3.(8) The expenditures of the funds by the type of the recipients

	1993	1994	1995	1996
State authorities			274	315
Municipal/local authorities			435	927
State institutions (schools, universities)			35	47
Non-governmental organizations			54	81
Total expenditures	186	239	798	1370

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(9) The expenditures of the funds by the purposes on which the resources were spent (thousand MDL)

	1993	1994	1995	1996
Total of the investment projects including :				338
technologies/machinery				338
non-investment projects	186	217	628	961
overhead costs of the fund		22	-	71
administration costs				
other				
Total expenditures				

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(10) General expenditures of the NEF (thousand MDL, in current prices)

	1993	1994	1995	1996	1997
Total incomes	81.2	95.7	193.2	208.8	167.0
Total expenditures	65.5	97.9	188.4	224.2	164.0
Balance at the end of the year	16.4	14.2	19.0	3.6	6.6

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(11) The incomes of the NEF (thousand MDL, in current prices)

	1993	1994	1995	1996	1997
Balance at the beginning of the year	0.7	16.4	14.2	19.0	3.6
32% payments from local environmental funds	81.2	95.7	193.2	208.8	167.0

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(12) The NEF expenditures on environmental protection by kinds of payment (thousand MDL, in current prices)

	1993	1994	1995	1996	1997
Grants	65.5	97.9	188.4	224.2	164.0

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(13) The number of supported environmental protection projects by the kinds of payment

	1993	1994	1995	1996	1997
Grants	11	10	15	30	25
Total number of environmental protection projects	11	10	15	30	25

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(14) The NEF expenditures on the environmental protection, (thousand MDL, in current prices)

	1993	1994	1995	1996	1997
Environmental protection/ preservation	14	5	5	12.3	25.9
Education on the questions of environmental protection	7.5	32.9	127.4	152.9	108.9
Monitoring and informational systems	44	60	56	59	29.2
Total expenditures on the environmental protection	65.6	97.9	188.4	224.2	164.0

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(15) The NEF expenditures by the type of the recipient, (thousands MDL, in current prices)

	1993	1994	1995	1996	1997
State authorities	44	60	108.5	124.5	77
Municipal / local authorities	14	5	4.7	12.3	30
State institutions (schools, universities)	7.5	10	26.2	9.4	15
Non-governmental organizations		22.9	49	78	42
Total expenditures on the environmental protection	65.5	97.9	188.4	224.2	164.0

Source: DEP Environmental Strategies and Programmes Division

Table 2.3.1.(16) The NEF expenditures by the purposes on which the resources were spent, (thousand lei, in current prices)

	1993	1994	1995	1996	1997
Non-investment projects	65.5	97.9	188.4	224.2	164

Source: DEP Environmental Strategies and Programmes Division

In accordance with accepted methodology of statistical record the structure of general expenditures for environmental protection includes:

- current expenditures, which include the expenditures on the maintenance of environmental objects, keeping in the working condition and reparation of the existing environmental protection objects together with the expenses for governmental environmental control and protection agencies maintenance. These expenditures come to 60 - 70% of the total expenses.
- expenditures on renewal of the industrial basic environmental protection funds (water purification and dust-collecting devices). In the total expenses these expenditures come to 10%.
- investment in environmental protection and rational utilization of the natural resources, which come to about 25% of the total expenses.

Table 2.3.1.(17) The Expenditures on the Environmental Protection

	1993	1994	1995	1996	1997
Total expenditures on the environmental protection	12597.2	57734.8	73176.5	91911.7	102595.6
The expenditures of the NEF	65.5	97.9	188.4	224.2	164.0
The NEF expenditures in the total expenditures on the environmental protection	0.52	0.17	0.25	0.24	0.16

Source: DEP Environmental Strategies and Programmes Division

Notes: 1994: 100 USD is equal to 407 MDL

1995: 100 USD is equal to 449 MDL

1996: 100 USD is equal to 460 MDL

1997: 100 USD is equal to 463 MDL

1998: 100 USD is equal to 471 MDL

The regional environmental protection agencies (quarterly) and Chisinau Environmental Fund (annually) report about the resources entry and their use to the Department for Environmental Protection. The Department generalizes the data and addresses it to the Department of the Statistics (statistic report 1-EF).

The Fiscal Inspectorate and Ecological Prosecutions Department perform the control of the NEF resources use.

(3) Fund Management

The Direction of the Accounting and Finance of the Environmental Protection Department is keeping record of NEF resources. On-line data about incoming resources and their utilization are supplied to the Environmental Strategies and Programmes Division. The resources of the environmental funds are being appropriated on the basis of written request, which is filled up in an optional mode. The activities should correspond to fields, which can be financed by environmental funds. The request should be addressed to the General Director of Environmental Pollution Department and after a positive decision about financing the project is made a contract or another document is worked out, which is signed by the General Director, accounting chief and the applicant. Then the resources are transferred to applicant's account.

The Environmental Strategies and Programmes Division prepares the annual plan of NEF resources expenditures, but due to the instability of resources entry and their use mostly for short-term measures this plan has a formal character.

(4) Application for Assistance

Till now all financial information requested from the applicant was presented in a free mode without any standards in filling up the forms and in types of the documents, which should be presented. Nowadays a set of standards in this field is prepared with the help of the Department of Statistics. The project cycle will be introduced. From the environmental funds would be financed only those projects, which passed all stages of the project cycle.

Planned changes

Initially, a relatively large number of projects will be funded through the National Environmental Fund, which will require adequate contributions. When the skills and capacity of local funds will have been upgraded, more decision-making on project financing should be delegated to the administrative councils of local funds. Initially, NEF would need to concentrate on project management,

requiring clear rules on how projects should be documented in applications. Secondly, there should be a financial assessment to check the viability of a project. This should lead to the selection of the financial instrument to be used when accepting the application (grant, interest subsidy, subordinated loan or other).

The balance sheet of NEF will depend very much on the environmental charges prescribed by the law. The review of methodology to set environmental charges has been requested on many occasions. Currently, DEP needs help to carry out this very ambitious task. The National Institute of Ecology should be involved, and the Ministry of Economic Reforms and the Ministry of Finance should help DEP to upgrade the Methodological Instruction (1991) on environmental charges and pollution limits. Currently, the draft law on environmental charges (ecological taxes) proposes to use multiples of the minimum wage to set charges for pollution. However, it is impossible to say how effective those will be. The answer might be found in the upcoming instruction on establishing AP and AAP limits. Limits and standards along with charges should be in line with the tax system and tax policy (particularly with taxes on natural resource use and taxes on land). The newly elaborated methodology, if biennially reviewed could be valid input for the law on environmental charges. The technique to determine charges for air pollution, water sewerage and waste placement on landfills should be adapted to modern European practice. For example, the waste hazardousness still refers to the former USSR methodological instruction.

In the meantime, the draft law on ecological taxes ought to be coordinated with other institutions. Articles 5, 6, 7, and 8 provide an illustration of the need for such cooperation. Article 5 stipulates, which vehicles should pay a fuel charge (petrol or diesel only). The charge is levied through customs procedures (as no petrol or diesel is produced domestically). Imported unleaded petrol and diesel will be charged 0.5 per cent and leaded petrol 0.2 per cent (of the import price of the fuel). The excise duty tripled in 1997. Therefore, petrol has become more expensive and this measure is going to push up the price further. It will also create inflationary pressure. The other aspect of this charge is that the excise duty is split between the Road Fund and the State budget. This new charge will be collected simultaneously with the excise duty.

Article 6 requires vehicles crossing the country's borders to pay an environmental charge. It is not clear whether this charge will replace the one that is already in place or be in addition. Secondly, the existing charge accrues to the Road Fund, but the new one is proposed to be NEF revenue.

Article 7 deals with water charges. However, the State budget currently determines how the revenue from the water charges is distributed among the Communal Water Supply and Sewerage Enterprises, and 'Apele Moldovei'.

Article 8 clearly incorporates charges that used to be revenue for local authorities managing municipal (and industrial) landfills. The Communal Waste Service Enterprises were financed partially through this revenue.

State Budgets

Another source of investment means in environmental protection is the state budget.

Table 2.3.1.(18) The Evolution of the State Budget Indicators in 1996-1998 (thousand MDL)

The title	1996 fulfilled	1997 approved	1998 project	Variance (+, -)	% 1998/1997
1. Fulfilled Scientific Researches					
The Department for Environmental Protection	830.2	770.0	770.0		100.0
Scientific research which don't belong to any other categories					
The Department for Environmental Protection	26.9	30.0	30.0		100.0
2. Environmental Protection and Hydrometeorology					
The Environmental State Inspectorate and Regional Environmental Agencies	2510.7	3100.7	3000.0	-100.0	96.8
"Hidrometeo" Service	3605.1	5100.0	5100.0		100
The Department for Environmental Protection (administration bodies)	375.0	350.0	380.0	30.0	108.6
3. The Agriculture, the Forestry, the Fisheries and Water Management					
The Ministry of Agriculture and Alimentation (Republican Trust for the "Apele Moldovei" Water Management Independent Body)	43367.1	33000.0	27500.0	-5500.0	83.3
The Ministry of Agriculture and Alimentation (the "Acvaproiect" Project Institute)		2000.0	2500.0	500.0	125
4. Communal Service Management and Housing Stock Management					
The hygiene activity, including the control of environmental pollution	101.6	270.0	270.0		100.0

Source: The State Budget Project for 1998

Table 2.3.1.(19) The forecast for 1998 of the DEP special resources

The title	The resources volume (thousand MDL)
Environmental protection	1100.0
Hydrometeorology	833.1
Total amount	1933.1

Source: The State Budget Project for 1998

According to article # 12 of the Law on Budget System and Budget Process a special resource of the institutions financed from the budget is considered to be the income of this institution obtained from payments for their services, for work fulfillment or for any non-compulsory activities.

Table 2.3.1.(20) The applied scientific researches financed from the state budget in the field of the environment and natural resources

The involved Ministries and Departments	The Volume of the Allotment (thousand MDL)
The Ministry of Economy and Reforms	50.0
The Ministry of Education, Youth and Sport	252.8
The Science Academy	557.2
The Department of the Environmental Protection	770.0
National Agency for Geodesy, Cartography and Cadaster	17.7
Total amount	1647.7

Source: The State Budget Project for 1998

Table 2.3.1.(21) Environmental protection and natural resources main indicators

The indicators	Measurement units	1996 actual	1997 pre-liminary	1998 forecast
Investments in environmental protection	mln MDL	6.2	13.9	21
including from the budget	mln MDL	5.6	2.7	7.7
The volume of consumed water	mln mc	428	428	437
including for production necessities	mln mc	145	144	147
The volume of discharged sewage	mln mc	9.9	9.9	9.9
The volume of air pollution from stationary sources of the pollution	thousands tone	36.7	42.8	43.7
The charges for natural resources	mln MDL	13.1	15.4	16.1
including for :				
water resources	mln MDL	12.8	15	15.7
mineral resources	mln MDL	0.3	0.4	0.4
The charges for environmental pollution	mln MDL	2.6	2.3	5.5
The construction of the antierosional hydro-technical devices	mln MDL	4	6.4	9.3
The treatment of the erosional lands	ha	44	301	809
The recultivation of the lands	ha	38	156	308
The sowing and plantation of the forests	ha	1112	1000	100

Source: The State Budget Project for 1998

The state investment policy in 1998 will be directed to finishing the construction of the objects with a high level of completeness and of vital importance at the state and republican level. The list of these objects includes main pipelines of water supply.

In 1998 in addition to the budget financial resources is expected the implementation of some projects financed from the account of the credits granted to the state or given under the governmental guarantee, usually received from the World Bank and the European Bank of Reconstruction and Development. At different stages of completeness is situated a number of projects, which are to be implemented in 1998, among them is a project of provision with potable water of Chisinau, negotiated with BERD.

2.3.1.1. Standardized Funding Mechanisms for Investments in Water Pollution Control

Proposals for funding a new project are forwarded by local and/or central public authorities. Project allocation is not based on cost-benefit criteria, though optimal selection would be very important in times of budget deficits. Economic analysis is restricted to an expense assessment. There is no in-depth analysis because the proposed project does not provide the necessary information.

During the drawing-up of the investment plan, specialists essentially strive to coordinate the list of accepted objectives with the applicants, the Ministries of the Economy and Finance and the Government. Then the selected projects with their budgets are included in the investment plans, prepared by the respective unit of the Ministry of Economy and approved by the Government. Only at that stage can the project be carried out. In practice, even when the necessary funds are available, the lack of materials, technical building capacity, equipment, and specialists make it impossible to go ahead with the projects. In such situations, funds are re-allocated, deadlines delayed. When a project does go ahead, the result is faulty design and building, slapdash work, unfinished units put into operation and, ultimately, insufficient exploitation and further costly investments to correct deficiencies.

2.3.1.2. – 2.3.1.4. Typical Sources of Investment Money for Municipal, Industrial and Commercial Wastewater Treatment Plants

There are no typical sources of investment money for municipal, industrial and commercial wastewater treatment plants. No special municipal fund exists for such purposes and obtaining credits from the commercial banks is very difficult for such unprofitable activity. The state and local budgets are also not very willing to offer loans or grants without real guarantees of returning the money.

The only source of financing this activity is the wastewater treatment plants own profit, which is very low.

A recent source for this field appeared with the EBRD loan for the “Apa Canal Chisinau” Enterprise. This project is elaborated to cover mostly activities of primary importance and urgency for preventing the catastrophic aggravation of water supply and sewage network and for decreasing the production costs and water leakage. The successful fulfilling of the project must let the enterprise continue the work on the improvement of water and sewage network and facilities on its account.

2.3.1.5. Agricultural Pollution of Ground Water and Surface Water

There are no established funds or credit institutions for financing the pollution control measures in the agricultural sector. For the future it is planned to finance these measures from the National Environmental Fund.

The financial means from the Ministry of Agriculture and Alimentation for water supply in rural areas are divided for:

- the irrigation – 95%
- the sewage services – 5%

This is the explanation of the fact that 90% of the rural population are using wells for water supply and don't benefit from the sewage services.

2.3.2. Private Financing Models in Use

Another source of financing environmental programmes constitutes the funds of enterprises. At the moment, business is weak and shrinking industry is a poor contributor to environmental plans.

So far, there was no particular model for environmental programmes financing.

A particular effort is required to focus managers' attention on low-waste production technology once resources for large new investments become available. In a forward-looking attitude, environmental management systems (ISO 14000 series) ought to find a place in the managerial practices of entrepreneurs. The recycling and reuse of packaging should be taken into account, as should labeling for future recycling.

2.3.2.1. Build-Operate-Transfer

Such a financial model like BOT is not used in the Republic.

2.3.2.2. Private Management of Services

The recent process of privatization didn't reach the field of services of environmental pollution reduction. Under the market conditions and current legislation private management of such services is not profitable yet.

2.3.2.3. Leasing Models

In the Republic leasing models are very poor developed in all fields, especially in those connected with environmental protection.

2.3.2.4. Other Financial Models

DEP and its regional environmental agencies have the right to diminish the amount of payments for pollution received from economical agents under the condition of using new anti-pollutant technologies.

2.3.2.5. Licensing and Monitoring of Privately Financed or Operated Services

Users of water should obtain an environmental license for water uses and are subject to taxation for this use. A license has to be obtained for wastewater discharges. It is issued by the environmental authorities in agreement with NCSAHE and communal sewerage enterprises. Wastewater discharges into bodies of water are authorized only where they cannot result in an increase of the pollution level above the AP limits. Otherwise, the water user has to ensure treatment so that water effluents meet the established standards. Should the above-mentioned requirements not be met, the discharges might be restricted. The enterprise could be forced to discontinue production temporarily. The plant also might be completely shut down by the environmental authorities.

The water licenses, according to the Internal Revenue Inspection (Rule No 09-24-04 of 12 December 1995), cost legal entities 50 times the minimum wage (900 Lei) and individuals 20 times the minimum wage (360 Lei).

The natural resources (soil, water, minerals, flora and fauna) as well as the air and space above the territory are State property (Constitution (Art. 127), LEP (Art. 4)). The Parliament has the right to issue concessions for the use of natural resources. The Law on Natural Resources (1997) determines that the ownership of natural resources can be either public or private (Art. 9). The Law serves as a framework for transferring natural resources by concession agreements (Art. 11).

The Law on Foreign Investments (1992) has an article on 'Concessions and concession agreements' (Art. 46). When a concession agreement is signed, the Government issues a resolution to transfer the natural resources. This resolution automatically frees the foreign investor from the requirement to obtain a permit to set up an enterprise with foreign capital. Nevertheless, investors will still need a license for their activity. A 20-year concession to Redeco Ltd. for oil and gas research and exploration in the southwest of the country has been granted (the drilling started in September 1995). A 25-year concession for the planned oil terminal in Giurgulesti was delivered to Terminal S.A.

The system of permits and licenses was inherited from the former planned economy. The Ecological Expertise Division (DEP) assesses new construction projects, and the reconstruction of water facilities. Bigger projects (public and private) must be assessed for their impact on the environment. Usually, new business projects estimate the risk posed by their construction and operation on the environment and on health.

The Natural Resources and Licenses Division (DEP) issues ecological permits to manufacturers. It is in charge of the water survey (surface water, groundwater, and water management).

Standards are also important regulatory instruments. In the World Bank's opinion, a system of environmental standards should be developed for ambient water and air quality. The standards should be realistic and gradually strengthened, compliance with EC standards being the proposed goal.

To prepare air quality and other standards, DEP has at least to collaborate with the Ministry of Health and the Academy of Sciences. The standards have to have a new foundation if the country is oriented towards the European Union. Regulatory measures have to be cost-effective. However, the economic and finance units dealing with this aspect at DEP are understaffed.

Environmental management at company level remains a problem. In the past, there was some sort of environmental management and monitoring, but the monitoring institutions have been abandoned. The Environmental Inspectorate continues to be the institution that enforces the regulations. However, the enforcement of the law remains problematic. At present, the ISO 14000 series is virtually unknown to business. The ISO 9000 series is currently a priority in the manufacturing industry.

2.3.3. Actual Water and Wastewater Tariffs/Charges

2.3.3.1 Actual Tariffs Policies and Systems

Payments for the use of water resources are made in accordance with Government Decision No. 262 of May 1994. The levels of charges depend on whether the water concerned is drawn from rivers or from underground resources. They also differ according to the purpose of the use. For instance, the rate is lower for water used as cooling water for electricity generation, for irrigation or fisheries. The rates are valid for water use within the limits of established water consumption quotas, established by Apele Moldovei and the Danube-Nistru Basin Inspectorate. In excess of these quotas, the rates increase drastically.

The Law on Natural Resources (1997) prescribes that the taxes on resource use within the allowed limits are included in production costs. Charges due when using more is not included in production costs, but reduce profits directly. The tax on natural resources should cover the cost of exploration, research, restoration, transport and sustainable use. The State Budget sets the annual tax rates for each natural resource.

Payments for the pollution of water resources depend on the type and level of toxic pollutants that are present in the waste water that is discharged into sewers or into nature. Payments rise progressively when discharges exceed the set limits. Although payments for pollution are obligatory for all economic actors, only enterprises and organizations located in Chisinau have actually paid up. Even here, the sums paid often represent only a small part of the payments due.

In accordance with the Governmental Decision No. 517 of August 1995 “On measures of ordering and state regulation of tariffs” the tariffs for water supply and sewage services are validated by executive authorities coordinating with the Ministry of Communal Service on the basis of the tariffs elaborated by the local waste water treatment enterprises.

Table 2.3.3.1.(1) Level of tariffs for potable water and sewage services in different localities (see Annex B-1).

2.3.3.2. Level and Structure of Cost

We will reveal the structure of treated water cost by the example of the “Apa-Canal” Chisinau expenses.

Table 2.3.3.2 The structure of cost

N	Cost categories	Units of measurement	Potable water			Discharged water				
			1996	% in total cost	1997	% in total cost	1996	% in total cost	1997	% in total cost
2	Materials	Lei	2401500	3.4	2311100	2.6	3300	0.2	185400	0.7
2	Electric energy	Lei	35629200	50.8	42615600	47.2	5769300	30.5	6388100	23.5
3	Expenditures on salaries and social security	Lei	666600	0.9	1172800	1.3	565000	3.0	840000	3.1
4	Fixed assets depreciation	Lei	5924000	8.4	5712800	6.3	2841100	15.0	2677400	9.8
5	Expenditures on home pipelines service	Lei	1652300	2.4	3200500	3.5	1102200	5.8	2133600	7.8
6	Expenditures on current repairation of the fixed assets	Lei	7866300	11.2	23152800	25.6	1349100	7.1	7697100	28.3
7	Operating costs	Lei	11930000	17.0	9722800	10.8	6074000	32.2	6698800	24.6
8	Other expenditures (water taxes, land taxes)	Lei	4110900	5.9	2441900	2.7	1190400	6.3	566100	2.1
9	Total expenditures	Lei	70180800	100	90330300	100	18894.400	100	27186500	100
10	The volume of supplied water	1000 m ³	120622		120728		110666		110813	
11	The cost for 1m ³ of water	Lei/m ³	0.58		0.75		0.17		0.25	
12	Average tariff including:	Lei/m ³	0.78		1.07		0.25		0.34	
13	Population	Lei/m ³	0.30		0.42		0.10		0.14	
14	other consumers	Lei/m ³	2.20		3.10		0.80		1.10	

Source : The Ministry of Economy and Reforms

100 USD = 471 MDL

In 1997 preferential tariff for population was 0.24 Lei

In conclusion, the actual situation can be presented as follows:

- There is a high level of unrecorded water (defined as a difference between pumped for distribution and supplied water in % from pumped water) – 30%. In 1997 the volume of pumped water was 172,740 thousands m³, but the volume of real supplied water was only 120,728 thousands m³. This situation is caused by the poor physical conditions of water pipeline network and the high level of leakage. At present times the number of reparations per year is about 800 on 100 km of pipelines. For comparison, in some capitals of CIS countries this indicator is about two times less. The level of average water consumption per capita in 1996-97 was 470 liters daily (when in European countries this level isn't more than 200 liters). A special observation was taken to determine the level of consumption at night and it showed the level of 267 liters, what proves once again the high leakage.
- The level of energy consumption is very high.
- There exists a decreasing ecological security of the sewage network.

2.3.3.3. The Level of Actual Cost Coverage

Table 2.3.3.3. The actual cost coverage

N	Categories of consumers	Potable water				Discharged water			
		Supplied water (thousand m ³)	% from total quantity of supplied water	Payment for supplied water (Lei)	% from total amount of payment	Supplied water (thousand m ³)	% from total quantity of supplied water	Payment for supplied water (Lei)	% from total amount of payment
1	Population	89671	74.3	35330820	26.8	85777	77.4	12008780	30.4
	including :								
	with preferential tariffs	12950	10.7	3108000	2.4				
2	Enterprises	17215	14.3	53366500	40.6	10825	9.8	11907500	30.1
3	Budget organizations	13842	11.4	42910200	32.6	14211	12.8	15632100	39.5
	Total	120728	100	131607520	100	110813	100	39548380	100

Source: the Ministry of Economy and Reforms

As in the other industry branches the system of cross-subsidies is used. It's when the tariffs for population are much more lower as the real cost of water, therefore the difference is covered by the high level of tariffs paid by the other consumers.

Moreover, the level of tariff's collection is very insufficient. On the 1st March of 1998 the debt receivable was 72 mln Lei, including:

- The population – 23 mln Lei
- The budget organizations – 19 mln Lei
- The enterprises – 30 mln Lei.

The debt of the population is caused by their inability to pay. As for the enterprises and budget organizations the debt is caused by too high tariffs and their poor financial condition.

2.3.4. Actual System and Practice of Pollution Charges, Fees, Penalties

2.3.4.1. Charges/Fees for Water Abstraction (municipal, industrial, irrigation)

Table 2.3.4.1. Charges/fees for water abstraction

Purpose of the use	Type of water source	Tax	Rate of the general tax	Limits (thousands m ³)	Payment rate for exceeding the limits	Comments
1. General tax on water supply		1.80 Lei per 10 m ³		63890.9	Ten times the standard rate (18 Lei per 10 m ³)	
a) Irrigation			50%	47269.4	Five times the standard rate (9 Lei per 10 m ³)	«Apele Moldovei» has the exclusive right to Establish water use limits.
b) Fisheries			50%	5142.5	Five times the standard rate (9 Lei per 10 m ³)	
c) Cooling water for electricity generation			30%	1715	The full rate (1.80 Lei per 10 m ³)	The same rule applies to fishery or irrigation facilities.
2. Hydropower station	surface water	free charged		---		introduced only in the 1998 budget law
3. Curative purpose or mineral water		10% of the sales price (excluding VAT)				That is the only provision that has not been charged since 1995.
4. Municipal centralized water supply		25 Lei per 10 m ³		---		These rates are paid mainly by household and collected by local authorities.

100 USD = 471 MDL

excluding the fishery Prut, which benefits from a tax holiday

2.3.4.2. Charges/Fees for Wastewater Discharge (exceeding defined quality standards)

In early 1990, the Council of Ministers decided to introduce pollution charges in 1991, the methodological and administrative instructions of which became available towards the end of 1991. The methodology was based on that of the former Soviet Union. The charges applied to enterprises, organizations and industrial conglomerates polluting the environment, for which the polluter-pays principle was introduced. Secondly, the collected charges were earmarked to finance environmental projects. Different charges were levied for pollution within allowable limits (AP) and for pollution exceeding them (AAP). The instruction was due to expire on 1 January 1994, but charges remained in force even after that date. The charges were to be paid out of profits.

Standard charges for water discharges were set in each region. They were applied to water discharges up to the AP limit, while excess discharges were ten times the standard rate. Enterprises are exempted in the year of investment in water treatment facilities. Revenues from enterprises connected to the public sewerage system for discharges below the AP limit went to the communal water utility (Sewerage Company). If an enterprise had its own treatment facilities, such charges went to the regional environmental fund. For AAP discharges, 30 per cent of the fees were credited to the regional environmental funds and 70 per cent to the Sewerage Company.

The estimated figure of the total amount of pollution charges and penalties for the whole country is 66.7 thousands lei (the source: National Environmental Fund administration).

2.3.4.3. Other Relevant Charges, Fees, Penalties

Article 95 of the Law on Environmental Protection obliges polluters to compensate for, or repair, damage caused to the environment in the manner and to the extent set by the legislation in force. The system of compensation for damage caused to different ecosystems is based on three Governmental Decisions. A Governmental Decision of 6 November 1989 deals with air pollution. A Governmental Decision of 1990 stipulates how damage to fish resources should be compensated for, and a Governmental Decision of 1992 deals with damage to fertile layers of soil and agricultural land.

The Parliament indexed charges to inflation in May 1993. Fines differentiate between individual and enterprise violators. An individual is fined 1 to 10 times the minimum wage (18 Lei/month) depending on the damage to the environment. Enterprises are fined 25 times the minimum wage. Local authorities can establish their own penalties for damage caused. This scheme is still in place.

A damage fee is imposed on international transport when entering or transiting the country. The fee depends on three factors: vehicle engine capacity, distance to destination, and type of fuel used. The territorial ecological inspectorates collect the charge at the frontier. Together with customs officials they measure each vehicle's pollution levels. The fee is 45 Lei if the pollution is within AP limits and up to 90 Lei if limits are exceeded. This levy accrues to the Road Fund. Currently, a proposal to consider this fee as an eco-tax and therefore pay it into the National Environmental Fund is before the Government.

2.3.4.4. Assessment of Efficiency of Actual Practice

The allocation of funds to different parts of the water management system does not appear to be optimal. The blurred delineation between authorities and agencies involved in the control and management of water resources reduces the efficiency of the system as a whole. Solving this administrative deficiency appears to require the elevation of the status of the environmental administration, before operational cooperation routines can be developed. Such routines should make full use of the existing provisions for environmental impact evaluation (EIE) with the full involvement of NGOs.

To improve the management of water resources, each river basin should be managed by its own authority under the “umbrella” of an appropriate national body. Basin-specific authorities should control water abstraction, the quality of return flows, pollution prevention, and operation and maintenance of the water management infrastructure.

The monitoring system is facing a complex situation and is not able to carry out all its tasks. The tasks and mandates of the authorities involved are in any case not clearly defined. One result of this state of affairs is the low rate of actually collected charges, taxes and penalties for water use and pollution. However, if the quality and coverage of the monitoring data improved, they could become the basis for planning and implementing strategies and projects more efficiently. In any case, an efficient monitoring and evaluation network is needed to prevent and control pollution. Upgrading the system of laboratories and strengthening the capability of staff to produce reliable data will initially require additional funds.

Also we are dealing with a highly inefficient cross-subsidies system. Household tariffs are low by any comparison. This has a significant impact on the financial position of municipal agencies, given the relatively large share of water consumption in the household sector, as well as providing little incentive for water conservation. On the other hand, the enterprises, which don't manage paying high tariffs have an increasing volume of debts. Low water prices, and consequently low revenues, are impairing operations of water and wastewater treatment plants and preventing investments to assure safe water supply to those that may currently rely on contaminated and poor quality water.

The supply of safe drinking water to the rural population is another big concern. Underground sources are very polluted. Preventing future pollutant discharges in the environment will require a major effort. Also, the wastewater treatment plants need to be upgraded, as does the sewer network in many rural areas. Small bodies of water flowing through or near villages are often used as open-air sewers, creating substantial pollution risks. The water supply to the rural population should be organized through viable least-cost systems, above all in terms of initial and recurrent investment costs. This will require optimization studies of a range of alternatives, which should in turn be analyzed through pre-feasibility studies. Many different alternatives should be assessed in each different local situation in order to determine the optimal scheme. The scheme should preferably be simple, easy to implement, maintainable by users (local authorities) and based, as much as possible, on local resources.

To this end, local authorities need a legal framework enabling them to enforce the overall policy and strategy for municipal water supply and sewerage, for drainage and for the industrial use of water. An appropriate local authority should manage, operate and maintain the rural and centralized water-supply system under the guidance of a central technical authority. For municipal water supply and sewerage, the role and respective responsibilities of the partners at the local level need to be clearly defined (legal, regulatory, institutional and financial), in particular for small municipalities, villages and rural settlements.

To adopt an adequate tariff policy, authorities should establish an efficient metering system to know how much water has been treated, extracted, pumped and piped and then supplied to users. This is the only way to ensure efficiency and to recover the real cost of water supply. It could be worthwhile exploring whether the introduction of metering equipment could be harmonized with other countries in transition, so that its production could become more attractive to investors.

The fines for damaging the environment go to the environmental funds, but their effect is limited, as the fines are based on the minimum wage (18 Lei), which is inflation-indexed. Current inflation rates mean that they are nevertheless quickly eroded and hence ineffective.

2.3.5. Economic and Financial Incentives for Pollution Reduction Measures

Moldova applies a combination of command-and-control and economic instruments to achieve compliance with environmental regulations. Permitting and compliance reviews are conducted by the State Ecological Inspectorate. The right to impose administrative penalties for the violation of ecological legislation has recently been introduced.

Environmental impact assessments and expert surveys of project documentation play an important role in minimizing the damage caused by the construction of different facilities, and in predicting the environmental changes that they will cause. These studies must be submitted, with the whole package of project documentation, to the State Ecological Expertise Unit.

The Government Decision “On the Regulation of Some Types of Activities in the Republic of Moldova” of 1995 stipulates, *inter alia*, that the exploitation of underground resources requires Government approval.

The following economic instruments are in place in Moldova to integrate environmental aspects in economic decisions:

- Taxes on the use of natural resources (soil, water, minerals, flora, fauna)
- Concessions for the exploration of natural resources
- Charges for environmental pollution and related services (discharge of polluting substances above the allowable limits and dumping waste)
- Fines for the violation of environmental legislation (standards)
- Fees to compensate for damage to the environment
- Excise duties on imported cars and fuels
- Subsidies
- Incentives to promote the rational use of natural resources, apply cleaner technologies, reduce waste, close water circuits
- Licenses issuing, etc.

The Law on Environmental Protection (1993) prescribes taxes on the use of soil, water, mineral resources and forests. Compensation as well as penalties are due in cases of environmental damage and violation of environmental legislation. The collected funds have to be spent exclusively on environmental needs.

The Law on Natural Resources (1997) prescribes licensing, concession and rent agreements, and a mechanism for the effective management of natural resources. This mechanism is based on the following provisions from the 1997 law, as well as other instruments:

1. the user of the resources should pay for their use;
2. the limits on resource use should be based on a rational use forecast;
3. corporate accounting should record the costs of using natural resources and the environment;
4. the pricing should apply full costs rather only operational costs;
5. incentives should be provided to companies that invest in cleaner and less raw material intensive technologies and to banks and investment funds if they finance such investments;
6. a commercial ecological bank should be established;
7. the use of mineral resources that contain environmentally dangerous components should be limited.

The law envisages public participation in decision-making concerning natural resources use, but no specific schemes for such participation exist. International agreements prevail if there is a conflict with national legislation.

Taxes on natural resources

The Law on Land Tax and Its Application (1992) regulates the *tax on the use of land*. Till 1995, the tax applied only to land used for agricultural purposes. It took both the quantity and the quality of the land into account. Each year, the State budget sets the applicable tax rates. The following Table shows the downward trend of the tax rates for agricultural land.

The tax was cut for several reasons. First of all, contribution to the State Budget is small (Table 2.3.5(2)). Only 58 per cent of taxes due were actually collected in 1996 (115.8 million lei compared to the 200 million originally forecast). Since 1996, the tax has gone entirely to local budgets (it makes up 35-40% of local revenue). Secondly, there was a political determination to relieve the peasants' tax burden. Thirdly, agriculture being the main sector of the economy, support was particularly needed in the period of structural change and ownership transfer.

Table 2.3.5(1) Tax rates for land use, 1995-1997

	1995	1996	1997
Graded hectare (Lei per ha)	2.17	1.53	1.00 ¹
No soil assessment (Lei per ha)	154.20	110.00	75.00 ²
In the area of settlements (Lei per 100 m ²)			
Urban area			
Chisinau, Belts, Bender and Tiraspol	100.00	10.00	10.00
Kachul, Dubosar, Orchei, Rybnitsa, Soroka, Ungen	-	4.00	4.00
Other urban areas	4.00	2.00	2.00
Rural areas	1.00	1.00	1.00
In the municipalities and industrial complexes (Lei per 100 m ²)			
Urban area			
Chisinau, Belts, Bender and Tiraspol	30.00	30.00	30.00
Other urban areas	10.00	10.00	10.00
Rural areas	10.00	10.00	-

Source: *the Law on 1997 State Budget.*
the Law on 1996 State Budget.
the Law on 1995 State Budget.

¹ For grazing land: 0.65 Lei per hectare.

² For grazing land: 50 Lei per hectare.

The tax on industrial land was introduced in 1995. The Concept of the National Tax Reform calls for a revision of the tax on land, and proposes to merge taxes on land and real estate. Today, industry, transport, and communication enterprises pay 70 Lei for each ha outside built-up areas. However, if there are also buildings or other manufacturing constructions or quarries on the plot, the rate jumps to 350 Lei per ha.

Table 2.3.5(2) Revenues from the land use tax, 1995-1997

	1995	1996	1997
Total revenue (million Lei)	91.7	115.8	115.0
to State Budget	10.6	0.0	0.0
to local budgets	81.1	115.8	115.0
Share of total budget revenues (%)	4.8	5.6	4.4

Source: Ministry of Finance.

Note: Data refer to the approved 1997 budget.

The tax on the *use of water* depends on the purpose of the use and, in certain cases, on the type of water source. The general rate is set annually in the State budget. The 1997 Law prescribes 1.80 Lei per 10 m³ of water supplied.

The rate is only half that if the water is used for irrigation and fisheries (excluding the fishery 'Prut', which benefits from a tax holiday) and within established limits. 'Apele Moldovei' has the exclusive right to establish water use limits. If they are exceeded, the payment due is multiplied by ten according to the 1997 provisions - it was multiplied by three before. The 'fine' for exceeding the limits reduces profits directly, but does not enter into the production costs. If a farmer is connected to the 'Apele Moldovei' irrigation network, he has to sign a water supply contract with the enterprise and pays to it half the general rate (0.90 Lei per 10 m³ of water supplied). If he is not connected to the Apele Moldovei irrigation network, he pays the same charge to the local budget.

Cooling water for electricity generation is taxed at 30% of the general rate. The full general rate is applied, if water use exceeds the set limit. The same rule applies to fishery or irrigation facilities. The 1997 budget law introduced a new charge for hydropower stations (0.05 Lei per 10 m³ of surface water used). When water is used for curative purposes or mineral water, the rate is 10% of the sales price (excluding VAT). That is the only provision that has not been changed since 1995. The rates for municipal centralized water supply are based on the water treatment and distribution costs. These rates are paid mainly by households and collected by local authorities. Households pay 25 Lei per 10 m³.

Taxes on the *use of mineral resources* are applied to the construction industry and the use of quarries. When local authorities issue licenses authorizing the exploration of mineral resources, the costs involved are calculated. The tax theoretically includes a fee for geological research, assessment and exploration of mineral resources. However, the Law on the State Budget has so far not taken this into account. The taxes on the use of mineral resources (Table 2.3.5(3)) accrued to local budgets in 1996-1997.

Table 2.3.5(3) Revenues from mineral resources tax, 1995-1996

	1995	1996
Total revenue (million Lei)	6.6	14.0
to State Budget	0.1	0.0
to local budgets	6.5	14.0
Share of total budget revenues (%)	0.3	0.7

Source: Ministry of Finance.

Note: 1995 – 100 USD is equal to 449 MDL

1996 – 100 USD is equal to 460 MDL

1997 – 100 USD is equal to 463 MDL

Government Decision 532 (10 August 1992) sets the tax rates for using timber. Payments are calculated for standing wood and depend on its location, the wood species, and cutting costs. The lowest rates are for softwood, the highest for hardwood species. The funds are shared equally between the municipalities and the forest authorities. The tax accounts for less than 2.5% of the wholesale price of timber (expert estimate).

Some licenses like those for *harvesting* mushrooms and berries, hunting wild animals, cutting plants and timber are granted by the forest authorities. Payments are collected when issuing hunting and fishing licenses. Provisional taxes were approved by the Director-General of DEP.

Pollution and service charges

The charges are applied to enterprises, organizations and industrial conglomerates polluting the environment, for which the polluter-pays principle was introduced. The collected charges were earmarked to finance environmental projects. Different charges were levied for pollution within allowable limits (AP) and for pollution exceeding them (AAP). The instruction was due to expire on 1 January 1994, but charges remained in force even after that date. The charges were to be paid out of profits.

The actual charges for air emissions from stationary sources were calculated locally. The methodological instruction included tables with rates per pollutant (and city/region), which were applicable to emissions up to the AP. Emissions exceeding this 'allowable pollution' were charged at five times that rate. Local authorities were permitted to adapt the standard methodology to local needs - a possibility that was seized only by the City of Chisinau, which raised the standards considerably.

Charges for air emissions from mobile sources were based on the degree of hazard of the fuels used. For private households, it was added to the price of petrol bought (0.01 Russian ruble per liter). For enterprises fuelling at special stations, it depended on their location, the fuel used (petrol, diesel or natural gas), the vehicle fleet, types of vehicles, and their use. Each enterprise kept a special record of its vehicles and their use, as well as for ecological monitoring surveys showing exhaust concentrations. The special vehicle surveys were conducted by representatives of regional offices of the Department of the Environment, the Ministry of Internal Affairs, and local authorities (like Chisinau Primaria), in order to verify whether vehicles kept to AP limits.

The payments for water discharges were designed similarly to the air emission charges. Payments for the pollution of water resources depend on the type and level of toxic pollutants that are present in the waste water that is discharged into sewers or into nature. Payments rise progressively when discharges exceed the set limits. Although payments for pollution are obligatory for all economic actors, only enterprises and organizations located in Chisinau have actually paid up.

The fees for the disposal of solid wastes depended on the type of waste and the location of the disposal site. As with other discharges, a limiting value for disposable quantities of wastes was determined, taking into account the costs of incineration or detoxification, and the capacity of landfills. For example, the Chisinau city authorities allowed only biodegradable waste to be disposed on its landfills. The actual fee was calculated so as to create an incentive for industrial enterprises to adopt cleaner and more energy-efficient technologies, encouraging the reuse and processing of the waste at its place of generation. The actual charges were listed in the methodological instructions for each type of waste. At the local level, municipal authorities, in cooperation with other institutions, could adapt the charges to local circumstances. For example, the fees charged in Chisinau were about three times higher than those listed in the instructions. In accordance with the instructions, charges to dispose wastes in excess of authorized quantities were three times the standard rate. However, illegal disposal or disposal on the basis of incorrect information resulted in fivefold charges. The local authorities could also adapt these provisions - Chisinau established a rate 10 times higher than the standard.

Excise duties

Excise duties on fuel were introduced in 1996.

State Budget sets the rate per tone of imported fuel. In 1996, it stood at 270 Lei per tone of leaded petrol and 100 Lei per tone of diesel. A part of the revenues (34.5%) accrued to the Road Fund and the remainder to the budget. In 1997, the excise duty was raised to 600 Lei per tone of leaded petrol and 200 Lei per tone of diesel. Fuel imports arrive from neighboring countries. Unleaded petrol is relatively expensive.

Since 1997, the obligatory excise duty on imported cars depends on the vehicle's age. Previously, it was based on engine power and the age of the vehicle. The rates varied from 1 to 10 per cent of the minimum wage, multiplied by the engine size in cm³. Special rates were set for spare parts, engines and lorries. However, private individual imports from CIS countries and Romania were exempted from VAT and customs duties on 26 May 1997.

Subsidies

The former planned economy subsidized agriculture, which was and still is in difficulty as it depends heavily on imported fertilizers, forage, and energy resources. In addition, the changes in relative prices within agricultural production make re-allocation of productive factors necessary, a process that the Government attempts to facilitate in part by subsidies. The system of subsidies was partly adapted to the economic reform. Now, the Government primarily subsidizes farms by setting State procurement prices above accounting costs. In addition, special facilities were introduced for farmers to receive credits at preferential interest rates. Nevertheless, an extensive system of indirect subsidies continues to exist.

While agricultural subsidies are documented better and few have a direct impact on the environment, the energy subsidies are more environmentally relevant. The World Bank, which recently advanced a 10 million dollars loan towards energy restructuring, is particularly concerned that Moldova should, at the same time, remove energy subsidies. A Presidential Decree (January 1997) instructed the Government to liberalize energy prices step by step, while protecting socially vulnerable groups.

Other economic incentives

The legislation stipulates rebates for legal entities that carry out environmental protection activities. The environmental protection investments can be deducted from corporate profit tax (environmental expenditures included). The Law on Foreign Investments authorizes a 50 per cent profit tax cut for a period of five years (Art. 37), if foreign capital investors obtain approval for their planned investment from experts of DEP and the National Center for Scientific and Applied Hygiene and Epidemiology (NCSAHE), concerning its technological safety (Art. 10).

DEP issues licenses to generate, transport, trade, and recycle hazardous wastes. A special register has been created for dangerous wastes. The environment and health authorities share the data. The impact of toxic waste on the population's health is monitored by NCSAHE. For radioactive waste, the licenses can be granted only if the radiation sources are equipped with secure protection systems for the personnel handling it. In addition, the waste should not harm the population or the environment in any way. To receive a license, detailed information on control devices, methods, and waste generation sources has to be provided. The Law on Corporate Profit Tax was amended in 1994 to stimulate toxic waste recycling. In addition, the Government, through DEP, sets charges for the storage and processing of industrial and domestic wastes. The authorities are preparing technical standards on waste transport, surface storage, incineration and final disposal. Till now, the former USSR standards and norms have been used.

2.3.6. Quality and Capacity of the National Banking System for Funding of Larger Infrastructure Projects (especially water sector projects)

Now in Republic of Moldova as in other countries (USA, UK, Germany, Austria) is created a two-level banking system. The first level is National Bank of Moldova, which has the role of the central bank in the Republic. As the only institution possessing the right of issuing money, National Bank of Moldova determines the monetary, credit and foreign exchange policy and monitors the process of its implementation together with a thorough control of the other banks' activity. National Bank of Moldova presents its reports only to the Parliament and exercises its activity in accordance with the «Law on National Bank of Moldova». The second level of the banking system consists of commercial banks, which directly fulfill the function of placing loans and money transfer services at the disposal of the enterprises and the population.

The National Bank of Moldova has implemented a number of measures aimed at strengthening the banks and minimizing the possible risks of their bankruptcy. This includes setting minimal aggregate normative capital at Lei 8 million and new requirements as to commercial banks' liquidity. Since January 1st 1998 the commercial banks have been required to increase their aggregate capital to Lei 16 million for the right of operations in foreign currencies and at Lei 24 million for operations in the Treasury Bills' market. In the fourth quarter of 1997, there was a massive increase of banks' capital as a result.

The exchange rate is determined daily on the foreign currency market, the Moldovan Interbank Foreign Currency Exchange. The National Bank of Moldova intervenes in the foreign exchange market in accordance with its overall monetary policy targets and with the aim of smoothing out the fluctuations in the exchange rate.

The commercial banking sector consists of 22 banks of which 20 are domestic, one foreign owned and one a subsidiary of a foreign bank. Moldova's banking sector is characterized by a high concentration of assets, capital and deposits in a few, formerly state-owned banks. At the same time, there are a few smaller banks, which are growing quickly and gaining clients' credibility. This is mainly due to the increased minimum aggregate capital requirement by the NBM as mentioned above, from Lei 4 million to Lei 8 million. It is likely that a few banks will not be able to reach these minimum requirements, but the NBM expects to be able to solve the problem without any loss to depositors. The introduction of International Accounting standards, originally targeted for October 1997, has now been implemented from January 1998. This in turn imposes certain problems regarding the re-organizing the accounts according to the new system.

Recently, the Government has introduced draft legislation to the Parliament on setting up a Development and Investment Bank of Moldova. The new bank is called upon to review the problem of current high interest rates on long-term credits. This bank's statutory fund is projected to come to Lei 24 million; Lei 16 million belonging to the State, the remaining Lei 8 million to the municipalities. The bank will have a number of tax privileges and will be involved in processing foreign investments coming to Moldova.

Table 2.3.6(1) Commercial banks of Moldova February 28, 1998

Name of bank	Total assets (Lei)
Moldova-Agroindbank	499278290
Moldindcombank	321562960
Socialbank	303837640
Savings Bank	239818900
Victoriabank	177385940
Investprivatbank	115015770
Mobiasbank	112458050
Universalbank	89043260
Fintorgbank	75550840
Eximbank	75338940
Petrolbank	72677060
BankCoop	68393840
Guinea	55915710
Oguzbank	55057990
Energbank	43847160
BIID-MB	25522870
Comertbank	20594120
Unibank	17846830
Vias	15715940
Businessbank	1403787
Nordbank	379340
Bucuriabank	524430
subsidiary Eolis	122110
TOTAL	2404438910

Source : the National Bank of Moldova

The National Bank of Moldova has continually improved its supervision of the commercial banks through an increase in the supervisory staff and intensive training and technical assistance. Banks whose ratings when monitored were less satisfactory are subject to monitoring by the NBM's Resolution Unit. However, a number of banks were unable to fulfill these requirements and had to be closed by the NBM in 1997. Meanwhile, two new banks were opened in 1997: Businessbank with 100 % foreign capital and the Energbank with 100 domestic capital.

To support small and medium business development, the European Bank for Reconstruction and Development (EBRD), and the International Bank for Reconstruction and Development or the World Bank (IBRD/WB), have elaborated strategies and programmes, one of which consists of credit line facilities. In 1995, EBRD chose two banks, Moldova-Agroindbank (MAIB) and Victoriabank, to be recipients of a \$ 20 million and a \$ 4 million credit line facility respectively, to finance new projects implemented by their present or potential clients. At present, practically the total amount of these credit lines has already been used up. Also, currently MAIB is a beneficiary of another \$ 2 million EBRD credit line facility, called Microlending programme. The mandate of this programme is to support small businesses by extending short term credits.

In the framework of the First Private Sector Development Project, the World Bank has established a credit facility, providing short and medium term loans. So far, it has selected 6 banks (MAIB, Victoriabank, Fintorgbank, Universalbank, Mobiasbank and Socialbank) to be financial intermediaries. According to the World Bank conditions, funds for financing a project can be

disbursed only after the project concerned has been approved by the Technical Unit, created for the purpose of monitoring the facility. At this stage, 6 out of 11 submitted projects have been already approved.

Besides Multilateral Agencies, some major international banks have showed a considerable interest for Moldovian market. ING Bank International established a Confirmation Line to MAIB and later to Victoriabank. The purpose of the facility is to make acceptable the financial instruments (Letters of Credit, Letters of Guarantee), issued by a local bank in favor of the exporter. Also, several Forfeiting Companies have expressed their interest in doing business with local commercial banks.

Furthermore, there are signs that commercial banks have begun to take advantage of the right to obtain shares in private enterprises. Banks are entitled to obtain up to 15 % of enterprises' shares. MAIB is the first bank that is gradually becoming an important shareholder.

The banking sector is still only confident about short-term activities including the short-term investment credits, rather than long-term credits. This situation isn't due to some specific difficulties in long term financing. The cause is that the most of external resources obtained by the bank are for short-term and the bank is forced to give long-term credits only from its own capital or international lines of credit. However there is a tendency in increase of medium and long-term credits. A more confident banking climate depends on resolving some of the existing problems very soon. The principal problems of Moldova's commercial banks could be considered to lie in a number of areas:

- poor banking management;
- absence of adequate strategic plans in the banking sector;
- low capitalization of the majority of the banks;
- inexperience in credit assessment;
- bad debts.

The last point mentioned above is a particular concern for the formerly state-owned banks, which are left with substantial bad debts as a result of Government-directed credit and bad borrowers. In 1997, a special fund was created by commercial banks (Risk Fund), destined to cover the eventual losses from the bad debts.

From this issue the structure of the commercial banks will be presented corresponding to a new methodology, so the information contained in Table 2.3.6(2) needs some explanation: the total banks' assets shown in the table are the net assets of the commercial banks (according to the new methodology the total assets exclude the transfers between the subsidiaries, the Risk Funds that have actually been formed and some other positions; the formed Risk Funds are excluded from the credit investments). The table also has a new additional column for "overdue credits". The overdue credits include not only the prolonged credits but also the credits on which the payments of the interest and principal have fallen behind the schedule.

Table 2.3.6(2) The structure of commercial banks; 1998 April 1st, 1998

Size of banks	Number of banks	Total assets (million Lei)	Regulatory capital (million Lei)	Capital/ Total assets (percent)	Credit investment (million Lei)	Overdue credit (million Lei)
Assets > Lei 100 million	7	1,766.85	416.91	23.6	1,364.02	145.13
Assets Lei 50-99 million	6	424.93	121.37	28.6	273.34	41.05
Assets Lei 10-49 million	7	215.94	91.49	42.4	96.04	3.65
Assets < Lei 10 million	2	2.9	2.09	72.1	3.48	3.44
TOTAL	22	2,410.62	631.86	26.21	1,736.88	193.27

Source: the National Bank of Moldova

There seems to be increasing confidence by households in the banking system. The households' deposits in the commercial banks increased by Lei 32.5 million in the first quarter of 1998. Households generally prefer to hold deposits in the domestic currency. The balance of households' deposits in domestic and foreign currency exceeded Lei 521 million, of which deposits in Lei amounts to Lei 425.6 million. The deposits in domestic currency increased by Lei 103 million or 32 % during April 1997 – April 1998. Nevertheless the foreign currency deposits increased by Lei 35 million or 58 % over the same period.

A completely different situation concerns the enterprises' deposits. In the first quarter of 1998, the enterprises' deposits were reduced by 7.9 %, from Lei 462 million on January 1st to Lei 425.5 million on April 1st, 1998. This reduction is mainly due to the considerable drop of Lei 37.5 in deposits in domestic currency. The reduction of enterprises' deposits is a seasonal fall. Moldovian economy are characterized by seasonal changes in different indicators, the largest share of GDP is produced in the second half of the year.

2.4. International Assistance in Funding of Environmental/Water Sector Programmes and Projects

2.4.1. Documentation of National Policies and Decision Mechanisms for International Co-funding of Environmental and Especially Water Sector Programs and Projects

The Foreign Policy Concept of the Republic of Moldova, approved by Parliament in February 1995, confirms the principles of international law, which are of special importance both for the Republic's foreign relations and for its environmental protection:

- The settling of international disputes by peaceful means;
- International cooperation;
- Bona fide fulfillment of international obligations.

Article 99 of the Law on Environmental Protection confirms the precedence of international conventions and agreements over the national legislation if the provisions in the international agreements are more stringent.

The Foreign Policy Concept document mentions that the Republic of Moldova will support the traditional activities of the United Nations and any new ones, in view of the trend towards a more active involvement of the United Nations in maintaining peace and security at the international level, real disarmament and environmental protection. The key priority of Moldova's foreign policy is a gradual integration into the European Union (EU). To this end, a series of measures has been planned to meet EU requirements for associate membership by the year 2000. In November 1994, Moldova signed a Partnership and Cooperation Agreement with EU, but it does not benefit from a general agreement. Trade with western countries is limited, and its main trading partners - apart from Romania and Germany - are in the former Soviet Union (Russian Federation, Belarus and Ukraine). The Partnership and Cooperation Agreement is not yet in force, as four EU member countries have not yet ratified it. In 1995, Moldova became a member of the Council of Europe. One of the preconditions was the abolition of capital punishment. For environmental protection, the Republic of Moldova established relations with international bodies, and governmental (e.g. ECE, OECD, UNDP, Council of Europe) and non-governmental organizations (NGOs) from different countries. Its environmental policy aims among other things to link up with international activities by:

- Improving international cooperation on environmental protection at the regional and European levels;
- Internationally harmonizing newly legislated instruments;
- Drawing up national programmes and setting up mechanisms for the implementation of conventions;
- Implementing bilateral agreements and participating in regional programmes (Black Sea, Danube).

The State strategy concerning international relations in environmental protection is based on the following principles:

- Adherence to different international conventions on environmental protection;
- Signing of bilateral and multilateral agreements at regional and international level;
- Participation in international programmes and projects;
- Establishment of permanent consultative ties with international organizations and representatives from different countries (governmental, NGOs);
- Establishment of relations with potential sponsors, banks and financial organizations.

The application of the Foreign Policy Concept as well as international cooperation in environmental protection may be facilitated by the signing of the Memorandum of 8 May 1997. Apparently the Memorandum confirms Moldova's territorial integrity, while granting special status to the Nistru left bank. Moldova has ratified nine international conventions (see Table 2.4.1(1)) and expects to ratify four more in the near future (see Table 2.4.1(2)). In addition, it has signed, but not yet ratified, the Convention on the Protection and Use of the Danube River. A National Commission was established by presidential decree in November 1996 to oversee the implementation of the provisions of the different international agreements. Its first session took place in June 1997, when sub-commissions were created and a work plan for the immediate future was established. The Commission's main tasks are:

- To ensure a common policy and coordination of activities connected with the implementation of international agreements to which Moldova is a Party, as well as cooperation with other Parties to these agreements;
- To draw up recommendations to improve the economic and legal bases for the implementation of agreements;

- To develop national programmes and projects to implement the agreements;
- To improve the control of their implementation;
- To draw up national reports for submission to the secretariats of the respective agreements.

Table 2.4.1(1) International agreements ratified by Moldova

International agreement	Ratified
Convention for the Protection of the Ozone Layer (Vienna, 1985)	July 1996
Montreal Protocol on Substances that Deplete the Ozone Layer (1987)	July 1996
United Nations Framework Convention on Climate Change (New York, 1992)	March 1995
Convention on Biological Diversity (Rio de Janeiro, 1992)	May 1995
Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	June 1993
Convention on Long-range Transboundary Air Pollution (Geneva, 1979)	July 1995
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991)	June 1993
Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992)	June 1993
Convention on the Transboundary Effects of Industrial Accidents (Helsinki, 1992)	June 1993

Source: DEP.

The Commission consists of representatives of DEP, the Department of Industry, the Ministry of Foreign Affairs, the Ministry of Economy, the Department of Civil Defense and Emergency Situations, the National Center for Hygiene and Epidemiology, the National Institute of Ecology, the Institute of Zoology, the Hydrometeorological Institute, as well as institutions responsible for the management of natural resources (Apele Moldovei, Moldsilva).

Table 2.4.1(2) International agreements selected for future ratification

Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971)
Convention to Combat Desertification (Paris, 1994)

Source: DEP and Hidrometeo Service.

2.4.2. Actual Financial Assistance from Bilateral and/or Multilateral Institutions

2.4.2.1. Completed and ongoing projects

Multilateral, regional cooperation

Cooperation in ECE

The Republic of Moldova is exposed to imported air pollutants, although the country is a net exporter.

Moldova acceded to the Convention on Long-range Transboundary Air Pollution in July 1995. A sub-commission for the implementation of the Convention was established within the National Commission for the Implementation of International Environmental Conventions. There is only one monitoring station, located in the southwest of the country, which is equipped to record transboundary air pollution. It is included as a station of the former Soviet Union in the list of EMEP stations. At present, financial constraints prevent this station from operating.

Moldova signed and ratified the ECE Convention on the Transboundary Effects of Industrial Accidents. DEP and the Department of Civil Defense and Emergency Situations are the focal points for this Convention. Although the Convention will probably come into force in the course of 1998, several of its relevant provisions are already incorporated in the regulations drawn up by the Department of Civil Defense and Emergency Situations. An emergency information system has been created. The inventory of the storage of hazardous substances is available. The inventory of hazardous processes has not yet been drawn up, because of the current industrial crisis. However, DEP has established a system of criteria for defining hazardous activities.

Since June 1993 Moldova has been a Party to the ECE Convention on Environmental Impact.

Assessment in a Transboundary Context. The focal point for the Convention is the Natural Resources and Licensing Division of DEP. The Division is not directly involved in assessing environmental impact, as this is the responsibility of the State Ecological Expertise. The relevant provisions of the Convention are incorporated in the Law on Environmental Protection and the Law on Ecological Expert Evaluation and the Evaluation of Impact on the Environment. As required by the Convention, Moldova notified its neighbors - Ukraine and Romania - of its intention to build an oil terminal in Giurgulesti on the Danube River. For large and complex projects that are likely to have a significant impact on the environment, EIA must be carried out at the feasibility study stage. The proposed oil terminal's capacity will be 2.1 million tones of oil products a year, half of Moldova's annual consumption. There has been no response from either Ukraine, or from Romania (neither of them being Party to the Espoo Convention).

Moldova has also ratified the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, as has its neighbor Romania, with which it shares important water resources. The Prut River, for instance, marks the western border between the two countries. In the northeast of Moldova, the Nistru River marks the border with Ukraine. Many of its tributaries also flow into Moldova from Ukraine. So far, Ukraine has not ratified the above-mentioned Convention.

In the early nineties, the Republic of Moldova joined the 'Environment for Europe' process. It took part in the Conferences of Environment Ministers in Dobris (Czechoslovakia, 1991), Lucerne (Switzerland, 1993) and Sofia (Bulgaria, 1995), and signed the respective documents. In conformity with Agenda 21 and the Lucerne Declaration, a National Environmental Action Plan (NEAP) was developed in cooperation with the World Bank. NEAP identifies the short-term

priorities and objectives for the next three years (1996-1998). Technical assistance and investments are needed for this period to address the NEAP priorities. The Moldavian and Russian versions of NEAP were approved in June 1996, making NEAP a binding document. In April 1996 the Environmental Strategies and Programmes Division within DEP was created. This Division is in theory responsible for environmental policy implementation at the national level.

Currently, Moldova is taking an active part in the preparations for the upcoming Conference of Environment Ministers in Aarhus (Denmark), and in particular in drafting the future convention on access to environmental information and public participation in environmental decision-making.

Cooperation in the CIS framework

The Republic of Moldova has ratified its accession to the Commonwealth of Independent States (CIS), except for all political or military agreements. Only the economic union agreements were accepted in April 1994, when Moldova became a member of the Interstate Economic Commission. The Republic of Moldova is also a member of the Interstate Ecological Council (IEC) of CIS. This organization was created in 1992. Its main functions are:

- Coordinating environmental policies;
- Harmonizing environmental legislation and standards;
- Drawing up and implementing joint environmental programs and projects;
- Establishing a common information system, gathering and exchanging information and experiences, and capacity building in information;
- Coordinating research in different fields;
- Developing a joint Red Book;
- Drafting agreed and common recommendations for the establishment of ecological funds;
- Coordinating international activities.

In February 1992, Moldova also signed an agreement with CIS on Hydrometeorology. Moldova's hydrometeorological agency "Hidrometeo" is a member of the Interstate Council of Hydrometeorology (ICH), an institution organized in the same way as the Interstate Ecological Council. The aims and programmes pursued by this organization correspond to those of the World Meteorological Organization (WMO), of which Moldova is also a member. However, as the same methodology, standards and equipment were in use throughout the former Soviet Union, Hidrometeo is closer to ICH than to WMO.

In April 1996, a CIS agreement on the control of transboundary transport of hazardous wastes was signed. This agreement has the same requirements as the Basel Convention, which Moldova is planning to ratify.

Danube and Black Sea protection

Moldova does not border on the Black Sea, but is located in its drainage basin. Moldova is thus interested and involved in Black Sea protection initiatives. The Foreign Policy Concept mentions that the Republic will actively participate in the ecological cooperation on Black Sea areas, in the Danube Commission and in the work of the preparatory committee for the Conference on Danube Cooperation.

In 1991, the Danube programme of UNDP, supported by the EU, initiated a regional programme for environmental management in the Danube River basin. Moldova joined this programme in 1993. It was designed as a technical assistance programme to protect the Danube River. The programme includes three subgroups:

- Monitoring, Laboratories, Information, Management (MLIM). Its tasks are to design and establish a common system and methodology of chemical analysis of water quality, international monitoring of the water, as well as developing a common data exchange format.
- Alarms, Emergency and Warning System (AEWS). This subgroup deals with prevention and warning of emergency situations.
- The Emission subgroup monitors water discharges in each country.

The main ongoing projects include research into phosphorus removal from detergents, the nutrient balance of the Danube River, and an inventory of water quality in rural areas. For all countries of the Danube programme, except for Germany and Austria, these projects are carried out with the assistance of the programme.

In the framework of the MLIM and AEWS subgroups, about 30 people from Moldova have been trained in hidrobiology and sample analysis, as well as in the interpretation of data to be submitted to decision-makers. During 1996 about 30 representatives of local water authorities were trained in European water management legislation, acts and norms as well as in European practice in this field. A series of five seminars was held - three seminars were designed to train trainers and two national seminars were aimed at local authorities. Thus, the Danube programme benefits local capacity building.

An important step towards international cooperation for the environmental protection of the Danube was the signing of the Convention on Cooperation for Protection and Sustainable Use of the River Danube (Sofia, June 1994). The Convention was signed by all countries of the Danube River basin. However, as it was decided that all Parties should contribute to this Convention in equal shares, Moldova would have had to make a substantial financial effort. As other countries are also facing this problem, the Convention is still not in force, but the sharing of financial obligations is being reconsidered.

In December 1994, the Ministers of the Danubian countries signed a declaration, specifying their objectives, priorities and strategies for inclusion in the Strategic Plan of Action for the Danube area.

Bilateral cooperation

Cooperation with Ukraine

In November 1994, a five-year cooperation agreement between the Ministry for Environmental Protection of Ukraine and DEP of the Republic of Moldova was signed. This protocol is of a general nature and calls for cooperation in the different fields of environmental protection: air and water, flora and fauna, chemical contamination of soils, processing and utilization of industrial and household waste, as well as exchange of information on energy- and resource-saving technologies, and mutual assistance in the event of an industrial accident or natural calamity. The main emphasis is put on cooperation to protect the transboundary Nistru River. Experts from Moldova participated in the impact assessment of the enlargement of the Novodnestrovsk hydropower plant (Ukraine), which is located close to the border with Moldova. The mitigation of its negative impact has to be examined further by the common working group. A special working group was established to carry out scientific research on water quality as well as to ensure proper water management.

Another special agreement has been signed between DEP and three bordering regions of Ukraine on cooperation in the event of an industrial accident.

In February 1994, an agreement on the common use and protection of transboundary waters was signed between the Governments of Moldova and Ukraine. Its main areas of concern are qualitative and quantitative protection of surface and groundwater, and prevention of any kind of pollution of those waters. The issues of fishing, irrigation, monitoring, measures in the event of an accident, etc. were discussed at joint working group sessions. The Republic of Moldova and Ukraine have drafted common water-quality objectives and water-quality criteria, which are currently awaiting approval.

Cooperation with Romania

In March 1997, a cooperation agreement on environmental protection and the sustainable use of natural resources was signed between Moldova's DEP and Romania's Ministry of Water, Forests and Environmental Protection. The main areas of cooperation are:

- Harmonization of legislation and technical standards;
- Implementation of joint EIAs when protected areas are expanded for the purpose of biodiversity conservation;
- Implementation of joint monitoring to provide decision makers with necessary information;
- Exchange of data on different issues including nuclear questions and accidents that have a transboundary impact;
- Promotion of cleaner technologies;
- Cooperation in the implementation of international agreements and conventions;
- Public participation and facilitation of access to environmental information;
- Environmental education and training, as well as the exchange of experiences and specialists.

The agreement foresees the establishment of a high-level political commission, supplemented with working groups on particular problems. A special working group on cooperation on issues concerning the river Prut is also envisaged. To coordinate activities on both Moldavian borders - i.e. with Ukraine and with Romania - there will be one working group on transboundary waters. At the time of writing, the agreement was not yet in force.

Cooperation on water resources between Romania and Moldova started even earlier. A common instruction on monitoring was signed by both Governments. Cooperation between the water companies 'Apele Moldovei' and 'Apele Romane' covers water use and management, as well as the protection of the Transboundary River Prut. Finally, a new agreement on water management cooperation regarding the Danube and Prut Rivers is currently being negotiated.

Cooperation with Belarus

In December 1994, an agreement was signed with the Belarussian Ministry of Natural Resources and Environmental Protection. This agreement is more general in nature than that with Ukraine, because Moldova and Belarus have no common border. The two partners committed themselves to coordinating the drafting of legislation, methodologies, energy- and resource-saving technologies, to protecting soils and their fertility, to using mineral and forest resources rationally, to protecting the genetic fund of rare animal and plant species, as well as to sharing information and experiences.

Multilateral, global cooperation

Transboundary movement of hazardous waste

Toxic waste is becoming a priority in Moldova, mainly because of obsolete pesticides and the storage of other chemicals. There is no information on transboundary movements of waste. Moldova is preparing to accede to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Department for Statistics is improving its accounting system of wastes, including hazardous wastes. Article 77 of the Law on Environmental Protection prohibits the import for any purpose (including transit) of hazardous waste or residuals. Some steps towards controlling transboundary movements of hazardous wastes have also been taken at the regional level. In April 1996, Moldova signed an agreement with CIS on this subject.

Although Moldova does not produce any nuclear energy, nuclear safety is an issue of concern. Moldova is surrounded by eight nuclear reactors, all of them located within 150 km of its borders. The Programme on Strengthening Radioactive and Nuclear Safety of the International Atomic Energy Agency (IAEA) includes projects concerning Moldova's situation. The country was only marginally affected by the radioactive fallout from the Chernobyl accident.

Protection of the ozone layer

In July 1996, Moldova ratified the Convention on the Protection of the Ozone Layer. Accession to the Vienna Convention was more an economic question. In fact, Moldova does not produce any chlorofluorocarbons (CFCs); it imports them mainly from the Russian Federation. As the Russian Federation had ratified the Vienna Convention, which bans the export of CFCs to non-Party countries, Moldova acceded to the Vienna Convention for the purpose of maintaining these economic relations with Russia. Imported CFCs are used for the production of refrigerators in Chisinau, as well as for repairing refrigerators. Financial assistance for consultations leading to the drawing-up of a national program to phase out ozone-depleting substances has been received from UNEP.

Climate change

Moldova ratified the United Nations Framework Convention on Climate Change in March 1995. By September 1998, Moldova has to prepare its national communication concerning the greenhouse gas inventory and policies to deal with them. According to the Convention, Moldova receives assistance from the Global Environmental Facility (GEF) to prepare it. During the negotiations on the Berlin Protocol, Moldova formed an unofficial working group with Armenia, Azerbaijan, Turkmenistan, and Uzbekistan.

Biodiversity and nature protection

Although there are different governmental decisions, Moldova does not have a specific law on biological and/or landscape diversity, but a draft law on protected areas has been prepared. It includes lists of protected species and protected areas (existing and new ones), as well as requirements for management plans. Protected areas are classified according to the IUCN classification. The draft law also includes the first list of soil protection areas and a list of protected wetlands. The identification of possible Ramsar sites (internationally important wetlands) and the establishment of biosphere reserves are foreseen. However, due to institutional problems, the draft law has been under discussion in Parliament since 1995. Moldova signed the Convention on Biological Diversity in 1992 and ratified it in May 1995. In June 1993, Moldova ratified the Bern Convention on the Conservation of European Wildlife and Natural Habitats. The requirements of those conventions are taken into account in the relevant policy and other documents.

In Autumn 1996, Moldova worked out a draft strategy for the conservation of biological and landscape diversity. The draft strategy is based on the National Strategic Action Plan for Environmental Protection and the Pan-European Biological and Landscape Diversity Strategy. The strategic part sets out goals, directions, principles, and *ex situ* and *in situ* conservation strategies. The Action Plan contains short-, medium-, and long-term actions, as well as the respective responsible organizations and time frames. The goals to be achieved are: minimization or elimination of negative impacts on biodiversity, sustaining the recovery capacity of biological and landscape diversity, economic integration of territories, as well as public participation in the conservation of biological diversity. The draft strategy should be approved by the Cabinet of Ministers or by Parliament. If it is implemented, the percentage of protected areas will increase from 1.42% to 2% of the country's territory.

National authorities and experts are aware of the importance of joining other biological conventions. Some preparatory steps have been taken to ratify the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat. Moldova is also preparing to accede to the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Ratification of the Washington Convention in the near future could be difficult, due to a lack of manpower and finances.

Follow-up to UNCED

Moldova took part in the United Nations Conference on Environment and Development (Rio de Janeiro (Brazil), 1992) and signed its final documents. Different aspects of Agenda 21 are reflected in the concepts and strategies for socio-economic development. The National Strategic Programme of Action of the Republic of Moldova in the field of Environmental Protection and Rational Use of Natural Resources follows the principles set in Agenda 21. Despite the fact that sustainable development and Agenda 21 are known and accepted concepts, in some governmental institutions their application is not planned systematically, but only as part of some selected policies, there being no common concept used in practical action.

In 1996, the Committee on Scientific Problems and Sustainable Human Development was established by presidential decree. It includes prominent scientists together with representatives of art and culture, business and NGOs. Its purpose is to draw up recommendations for the improvement of scientific and social policy. The Committee is not yet widely known, even in ministries. Also, the Committee does not seem to command any operational resources, so that its capability to fulfil its mandate is doubtful.

In 1997, project Moldova 21 was proposed by UNDP within the framework of the Capacity 21 project. The global Capacity 21 initiative provides support to work out and promote sustainable development strategies. Through Capacity 21, UNDP will assist the Government of Moldova in a range of activities:

- Institution and capacity building favoring the implementation of Agenda 21;
- Identification of technical assistance needs related to Agenda 21 and promotion of environmentally sound projects;
- Incorporation of public participation in the application of sustainable development principles.

The project will mainly focus on strengthening the existing High Economic Council to the President in order to promote sustainable development and Agenda 21 issues in Moldova's strategy for the next century. Particular attention will be paid to the capacity building of DEP for the implementation of Agenda 21 issues. The project will be financed by the Capacity 21 fund, administered by UNDP.

International funding

Moldova has received financial assistance from the International Monetary Fund and the World Bank, as well as grants from the European Union, France, Germany, Italy, Japan, the Netherlands, Romania, Turkey, and the United States. The United Nations and other organizations have provided technical assistance worth US\$ 34.1 million including US\$ 2.9 million for investments, and humanitarian assistance worth US\$ 12.3 million.

The Division of Technical Assistance and the Agency of Foreign Investments within the Ministry of Economy coordinates the technical assistance and promote foreign direct investment. Foreign direct investment is encouraged through a legal framework for property ownership, joint companies and guarantees, contained in the Law on Foreign Investment, including incentives such as tax holidays, repatriation of profits and tariff privileges.

Foreign direct investment (FDI) flows are modest in real terms but relatively large in comparison to GDP. In 1995, they represented 3.8% of GDP, or US\$ 15 per capita. Cumulative flows at the end of 1995 stood at USD 76 million, and at USD 121 million at the end of 1996. After a substantive increase between 1994 and 1996, FDI inflows diminished in the first half of 1997. The majority of FDI projects are directed to utilities and services (47%), manufacturing (13%), wholesale and retail trade (12%). Agriculture, construction and transport take less than 1% each.

The Ministry of Economy drew up a technical cooperation programme in 1995, which was approved by the Government. It deals with grants and non-credit financial assistance. According to the programme, the Ministry of Economy is responsible for coordinating the programme and ensuring its implementation, designing projects as well as negotiating with donors. Recipient organizations are responsible for the quality of projects and for creating favorable conditions for their implementation.

The Technical Cooperation Programme lists 17 sectors for cooperation. According to 1996 data, the total amount of technical assistance exceeded US\$ 42 million. The main areas that received technical assistance are: support for financial reform and the banking sector (27.38%), restructuring of enterprises (12.17%), development of entrepreneurship (11.87%), and development of social infrastructure (11.02%).

Technical assistance for environmental protection amounted to only 2.18% of the total in 1996 (two projects, sponsored by the German Association for Technical Cooperation (GTZ) and the United States Agency for International Development (USAID)). The priorities are determined by the Government, and protection of the environment is currently not a top priority. The main part of all environmental project proposals is connected with scientific research.

In June 1996, DEP established a Project Management Office, which was financed by the World Bank till December 1996. It was designed to identify and prepare initial descriptions of projects to be considered by donors and investors, and to manage the projects funded by the Moldavian Government. The Office identified 36 projects, of which 6 have been selected and were under consideration in March 1997. The project proposals were forwarded to GEF, GTZ, the Danube Program Coordination Unit and the World Bank. Most of the remaining identified projects are included in the State Investment Programme for 1995 - 1997. Funding for this DEP Office has in the meantime been discontinued.

In the area of international cooperation as a whole, Moldova has taken a consistent general approach, which is being implemented in its broad lines. This is certainly an asset in the current circumstances. At the same time, the availability of a general approach does not provide clear guidelines for all practical aspects. For example, the commitment to closer ties with the European Union does not entail an action plan that could be instrumental to this end. Also, as environmental protection has been “de-selected” from the priority list for international cooperation, this could discourage initiatives from partners, which cannot offer cooperation in other fields.

The environmental administrations are currently poorly equipped for international cooperation related to national policy and management programmes. Training should not only aim at promoting the ability to assimilate foreign experiences, but should also target routines in environmental policy, management and enforcement measures. It would also be helpful for the preparation, negotiation and final implementation of projects funded in international cooperation, if DEP expertise in project management were strengthened.

DEP staff should receive intensive training in all aspects of environmental policy, management and enforcement as well as foreign languages and project management, as a prerequisite for improved access to international cooperation on environmental protection.

In spite of the current recession, Moldova has ratified a considerable number of international environmental conventions. In addition, bilateral agreements have been signed with neighboring countries. While the total picture of the network of international cooperation thus created is generally well adapted to the needs and possibilities of the country, it can be hoped that the priority of national policies in the area of transboundary movements of hazardous waste should be reflected in an early ratification of the Basel Convention.

According to Parliament's Decision to adopt the Noxious Substances Law, the Government will prepare the documentation to ratify this Convention in October 1997.

While there are high hopes that the recently created (November 1996) National Commission oversees the implementation of international agreements and that it overcomes the delays in implementing fully all provisions included in the agreements and conventions, further administrative measures could be taken to improve performance. Among these measures would be the allocation of responsibility for the implementation of the Espoo Convention to the administrative unit that primarily handles the national EIAs.

In accordance with the Law of Expertise and Environmental Impact Assessment, the National Institute of Ecology is responsible for EIA methodology.

To control transboundary air pollution, three to four additional stations on the border with Ukraine and northern Romania would be necessary. The full analysis of samples of transboundary air pollution should be performed in the laboratories of Hidrometeo, together with the National Institute of Ecology. However, this is possible only if Hidrometeo is equipped for the purpose.

2.4.2.2. Planned Projects

Table 2.4.2.2. Planned projects

Project title	Type of international institution	Type of assistance	Amount	Period (from 1998)
Development of a realistic system of water quality standards ¹	to be determined	Grant	45,000 ECU	6 months
Ukraine – Moldova Dnister River Basin management system : cooperating in the sustainable use and protection of transboundary waters ²	to be determined	Grant	5,000,000 ECU	24 months
Biodiversity and landscape conservation of the river Dnester middle and downstream ³	to be determined	Grant	N/A	N/A
Prut River tributaries: environmental review. Protection strategy and options ⁴	Tacis CBS	Grant	2,480,000 ECU	30 months
Sediment assessment in the Prut River ⁵	Tacis CBS	Grant	2,273,000 ECU	24 months
The reconstruction of Chisinau water supply system ⁶	EBRD	Loan	30,000,000 USD	17 years
The development of water resources ⁷	World bank, Japan Government	Grant RHRD	675,000 USD	to be determined
Cioc – Maidan watershed, town of Comrat ⁸	Turkey Government	Credit	6,000,000 USD	1997 – 2000
Reconstruction of water supply system in Ciadyr-Lunga ⁹	Turkey Government	Credit	6,700,000 USD	1997 – 2000
First Starting Complex of Conduits Groups for Local Water Supply of Vulcanesti and Taraclia Districts. ¹⁰	Turkey Government	Credit	6,000,000 USD	1997 – 2000

- Sources:
- 1 - The Ministry of Environment
 - 2 - The Ministry of Environment
 - 3 - The Ministry of Environment
 - 4 - The National Institute of Ecology
 - 5 - The Hidrometeo Service, "ACVA Project" Institute
 - 6 - The EBRD representation in Moldova
 - 7 - The IBRD representation in Moldova
 - 8 - The "Apele Moldovei" Independent Body
 - 9 - The "Apele Moldovei" Independent Body
 - 10 - The "Apele Moldovei" Independent Body
- Note :
- 100 ECU is equal to 527 MDL (5 June 98)
- 100 USD is equal to 471 MDL

2.5. Actual and Planned Public and Private Investment Portfolio for Water Quality and Water Management Programmes and Projects

2.5.1. Compilation of Actual and Planned Investment Portfolio

Planned Projects

Ukraine-Moldova Dniester River Basin Management System: Cooperating in the Sustainable Use and Protection of Transboundary Waters

The wider objective of the Project is to improve the Dniester River water quality as well as environmental quality in the Dniester River Basin. Specific objective of the Project is to assist Ukraine and Moldova in the development of the Transnational Dniester River Basin Management System. This system is to be in agreement with the guidelines of the UN Economic Commission for Europe (ECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and be approximated to the Proposal for an EU Council Directive Establishing a Framework for European Community Water Policy.

Biodiversity and Landscape Conservation of the River Dniester Middle and Downstream

The objectives of the Project are: to elaborate Programme of measures for protection of biodiversity along the river Dniester in Moldova and Odessa region of Ukraine; to substantiate formation of new reserve along Dniester down stream to preserve wetlands; to initiate measures to restore aquatic biodiversity and amelioration of the ecological situation in the middle stream of the river; to draft the interstate programme of sustainable management of the river Dniester bioresources.

Prut River Tributaries: Environmental Review, Protection Strategy and Options

The project is intended for involvement of local administration, sectoral (environmental, health, land planning, etc.) authorities and population to the process of environmental planning and decision making. The project will assist local authorities to obtain actual information regarding water quality of tributaries (local surface water resources) and Riparian Zones status. The project should help in prioritization of water quality problems, establishing of water quality goals and protection targets, introduction of strategic environmental planning at the local level (tributary basin), and identification of cost-effectiveness measures to reach environmental goals and targets.

Sediments Assessment in the Prut River

The project will be focused on Prut River stream along the Moldova and Romania border (695 km) including Costesti-Stinca water reservoir. The sediments related issues (which are usually having common or cross-border aspects) would be studied. The analysis of previous information and ordering of data according to the modern requirements (GIS, computer database, and models) will be carried out. The field investigation on the Prut River and Costesti-Stinca reservoir is crucial for assessment of actual status of sedimentation processes, prioritization of problems, risk assessment, protection strategy and measures formulation. The rehabilitation of sediments monitoring program and initialization of sediment quality monitoring program is important task for the project.

Development of a Realistic System of Water Quality Standards

A project has been identified which aims at enhancing the capacity of national authorities to revise the system of ambient water quality standards, with a strategy of gradually achieving their harmonization with EU standards. This will be realized through providing expert consulting and giving clear recommendations for the improvement of the system of ambient water quality standards, increasing its adequacy and offering more possibilities for compliance. In the long run this will improve the effectiveness of enforcement of water quality standards by the State Inspectorate and will contribute to the amelioration of water quality.

The Development of Water Resources

The main objectives of this project, developed by World Bank are: preparation of appropriate support legislation and appointing basin authorities or commissions for the two main rivers; training APELE/Aquaproject's technical staff in resource management; establishment of the basin-wide and central monitoring and evaluation capability; improvement database of existing and planned water supply developments; improvement database on actual water withdrawals (calibrate pumps); improvement database on river discharges (calibrate river gauges) initially at Olineste and Nezavertailovka and progressively at all other stations; strengthening Aquaproject's capabilities in inter-disciplinary planning and optimization techniques; strengthening inter-departmental cooperation in planning and programming capabilities by training and joint planning; defining responsibilities and accountabilities of water suppliers and water users; strengthening supervision of water resources uses/misuses and providing remedies for violators of ordinances; strengthening stake holders' active participation in development and in operation and maintenance of water resources developments; enforcing established quality standards; reviewing and updating water duties (consumption norms) for drinking + sanitary domestic water supplies; strengthening cooperation with riparian in improving the quality of effluents discharging into the Nistru, Prut and into tributaries.

The Cioc – Maiden Watershed, Town of Comrat Project

The aim of the project is qualitative potable and domestic water supply of Comrat District, which will considerably improve the population's health and will supply it with the enough quantity of qualitative water. The water from the artesian wells corresponds to the standards and it will be supplied to the consumers without purification. There are no problems regarding the Environmental Pollution at the moment, but in the future they may appear so, the necessary works are included in the Project. Water requirements will be satisfied from the underground waters by well drilling. The preliminary investigations showed the correspondence of this water to potable water standards. The alternative solving of this issue is the watershed from the Prut River and supplying the water to the consumers after purification. But at the moment is also expensive and we cannot afford its implementation.

Reconstruction of Water Supply System and Networks in Ciadyr-Lunga

The aim of the project is qualitative potable and domestic water supply of Ciadyr-Lunga, which will considerably improve the population's health and will supply it with the enough quantity of qualitative water. The water from the artesian wells must be subject to purification process. So, the purification system, which will be constructed requires chemical purification, herewith exists the problem of environmental pollution.

First Starting Complex of Conduits Groups for Local Water Supply of Vulcanesti and Taraclia Districts

The aim of the project is qualitative potable and domestic water supply of Vulcanesti District, which will considerably improve the population's health and will supply it with the enough quantity of qualitative water. The water from the artesian wells corresponds to the standards and it will be supplied to the consumers without purification. There are no problems regarding the Environmental Pollution at the moment, but in the future they may appear so, the necessary works are included in the Project. Water requirements will be satisfied from the underground waters by well drilling. The preliminary investigations showed the correspondence of this water to potable water standards. The alternative solving of this issue is the watershed from the Prut River and supplying the water to the consumers after purification. But at the moment is also expensive and we cannot afford its implementation.

Ongoing Projects

The Reconstruction of Chisinau Water Supply System

The biggest component of the programme is the program of the water pipelines network renovation (it's planned to replace about 105 km of pipelines). This will let to diminish the leakage on 40-45%. The project also comprises the replacement of old pumping devices, the purchase and installation of disinfecting devices for increasing the population security, the construction of the water supply tank and providing computer equipment, software and training for the Apa Canal company. The assistance programs are organized by EC and different foreign governments. Skilled experts of an Italian water supply company and English partners will assist the Company in reaching a certain purposes in financial and functional reorganization, the development of a long term investment program, training programmes, etc. The French organizations provided funds for programs together with the Chisinau Primaria, including the creation of the computer map of engineering network.

2.5.2. Inventory of Actual and Planned Investment Portfolio

In the first quarter of 1998 for the development of Moldova's national economy 190.1 mln lei in current prices were invested. The share of foreign investment in the total amount was 40% or 76.6 mln lei (equal to 16.3 mln \$). Average investment per capita in the first quarter of 1998 was 52 mln Lei, from which 21 mln Lei is the share of foreign investors.

The amount of investment from republican budget was 9.0 mln Lei and from the local budget 2.9 mln Lei. Private sources of investment were divided in:

the resources of economical agents	- 75.6 mln Lei
bank credits	- 0.5 mln Lei
the share of foreign investors in enterprises owners equity	-21.2 mln Lei
other financing sources	- 4.4 mln Lei

The level of direct foreign investment was 73.1 mln Lei and the level of foreign portfolio investment was 3.5 mln Lei.

Annexes

Annex 1.

Level of Tariffs for Potable Water and Sewage Services

Table 2.3.3.1(1) Level of tariffs for potable water and sewage services

Locality	Tariff for 1 m ³ /Lei			Tariff for 1 m ³ /Lei		
	Potable water			Sewage		
	Population	Budget organizations	The others	Population	Budget organizations	The others
1. Chisinau	0.42		3.10	0.14		1,10
2. Balti	0.25	1.012	7.98	0.10	0.262	3.088
3. Soroca	0.15	2.87	4.11	0.15	3.00	5.51
4. Edinet	0.40		2.60	0.40		1.70
5. Orhei	0.40		5.04	0.15		2.95
6. Straseni	0.55	5.00	6.50	0.20	3.80	3.90
7. Anenii Noi	0.25		2,13	0.25		1.63
8. Briceni	0.60		5.50	0.60		5.25
9. Basarabeasca	0.32		4.90	0.40		5.30
10. Singerei	0.30		4.18	0.40		5.97
11.Bratuseni	0.43		5.45	0.43		5.45
12. Cahul	0.28		2.57	0.14		0.98
13. Causeni	0.40		10.93	0.40		15.33
14. Calarasi	0.60	3.75	8.74	0.50	2.30	3.90
15. Criuleni	0.10		3.12	0.20		2.90
16. Cimislia	0.65	2.50	10.30	0.65	1.90	5.60
17. Ceadir-Lunga	0.60	13.0	16.20	0.60	3.30	4.40
18. Comrat	0.36	6.06	11.0	0.36	4.40	7.00
19. Cantemir	0.15		2.15	0.15		1.18
20. Cricova	0.22		7.05	0.10	1.15	2.10
21. Cojusna	0.48		0.62	0.09	1.15	2.80
22. Cainari	0.40		9.73	0.40		11.28
23. Costesti	0.50		7.11	0.40		8.05
24. Cornesti	0.25	3.00	4.06	0.25	2.00	3.0
25. Copanca	0.60				2.80	
26. Drochia	0.25	1.60	5.34	0.25	0.45	1.47
27. Donduseni	0.60		16.00	0.40		7.26
28. Floresti	0.30		2.64	0.36		2.89
29. Falesti	0.30		4.29	0.15		0.91
30. Floreni	0.69			0.40		
31. Glodeni	0.30	4.55	5.86	2.30	2.78	4.44
32. Hincesti	0.60	13.0	16.00	0.35	6.0	7.50
33. Ialoveni	0.42		6.65	0.22		6.80
34. Leova	0.25	5.90	7.65	0.10	3.20	3.71
35. Lipcani	0.70		5.75	0.70		5.65
36. Maximovca	0.45		4.80	0.24		2.84
37. Merenii Noi	1.00			0.66		
38. Nisporeni	0.60	2.30	2.70	0.45	1.60	1.90
39. Ocnita	0.32		7.29	0.28		2.77
40. Otaci	0.30		7.16			

Table 2.3.3.1(1) continued

Locality	Tariff for 1 m ³ /Lei			Tariff for 1 m ³ /Lei		
	Potable water			Sewage		
	Population	Budget organizations	The others	Population	Budget organizations	The others
41. Rezina	0.86		7.05	0.07		3.86
42. Riscani	0.50		3.22	0.40		2.71
43. Ruseeni	0.19	0.80	1.53	0.42	6.00	8.47
44. Stefan Voda	0.40		14.96	0.30		6.34
45. Singerei	0.70		2.83	0.60		11.07
46. Soldanesti	0.80	5.00	5.55			
47. Taraclia	0.60	8.00	9.85	0.40	6.00	7.73
48. Telenesti	0.80		8.80	0.40		5.10
49. Ungheni	0.40		1.14	0.40		2.14
50. Vulcanesti	0.50	8.70	12.40	0.50	7.00	9.16
51. Colonita	0.30		4.75	0.10		1.10
52. Stauceni	0.43	4.04	4.80	0.45	2.00	2.40

Source: Ministry of Land Development, Buildings and Communal Services

Annex 2.

Compilation of Actual Investment Portfolio

