DANUBE POLLUTION REDUCTION PROGRAMME

NATIONAL REVIEWS 1998
ROMANIA

EXECUTIVE SUMMARY

MINISTRY OF WATERS, FOREST AND ENVIRONMENTAL PROTECTION

in cooperation with the

Programme Coordination Unit
UNDP/GEF Assistance

DANUBE POLLUTION REDUCTION PROGRAMME

NATIONAL REVIEWS 1998
ROMANIA

EXECUTIVE SUMMARY

MINISTRY OF WATERS, FOREST AND ENVIRONMENTAL PROTECTION

in cooperation with the

Programme Coordination Unit

UNDP/GEF Assistance

Preface

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Ministry of Waters, Forests and Environmental Protection

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

Vienna – Austria, November 1998

Table of Content

1. Summary

Danube represents the biggest water resource for Romania being more than double ($85x10^9$ cm/year) in comparison with inland water (river and lakes), which represents about $40x10^9$ cm /year, but the possibilities of their use in natural regime are limited because of different technical reasons. Even so the importance of the Danube health is of major concern for Romania as well as other countries, and all measures and plans for pollution reduction are welcomed.

The overall ambient state of national water resources in Romania is fairly satisfactory and the last years trend shows a continuous improving of the water quality state. This data do not exclude the occurrence of serious local pollution problems in many places from different catchment area in the country where the pollution of some inland rivers exceeds the admissible limits which makes difficult and sometimes even prohibitive their use.

There are several potential adverse effects that might influence the population among their use of water, as well as the aquatic eco-systems. It includes discharging of toxic substances, organic pollution, leakage and pollution loads in rivers, reservoirs and sea, by human activities. The water environment of the Danube River basin in the Romanian area is considered as in other Danube countries being under great pressure from a diverse range of human activities.

In the urban areas the most significant adverse impacts are water quality generated by pollution from largely inadequate wastewater treatment plants and solid waste disposal facilities. In addition the lack and inadequate capacity and technology, old or inappropriate operation of wastewater treatment plants contribute to the increase of water pollution.

In the rural areas the absence of the water decentralized supply systems and sewage networks plus wastewater treatment plants have contributed to the worsening of the public health situation.

Moreover the modernization and intensification of agricultural practices and livestock production in some years were the major sources of non-point pollution of surface and ground waters.

Also the industry has its large part of contribution to both the alteration of the water quality and water pollution processes, mainly because of the old technologies that are used and the total absence or partial lack of wastewater pre-treatment plants respectively of adequate technologies.

In the present report the problem created by environment pollution includes all kind of effects of pathological, chemical, radiation etc. on health and well-being of the broad physical, psychological, social and aesthetic environment, which include water supply and sanitation, recreation etc. as used by the WHO assessment methodologies.

The experts have taken into consideration how water, unsanitary conditions, lack of education were likely to impact health in specific hot spots areas on the Romanian territory. This impact is varying depending on literacy rate, existing morbidity and mortality, existing location quality and quantitative aspects of water resources and current practices in the areas. The actual and future population potentially affected by water pollution can not be seen as associated with only one influencing the health.

Based on the analysis several aspects and process indicators as well as output indicators were taken into consideration like:

a. Diseases and death due to unsafe intake of drinking waters
b. The easiness of the access to reliable supply sources
c. Drinking water quality statistics

Some conclusions were established:

- There is a number of areas with a large concentration of « hot spots» that are creating problems for water environment and where also the morbidity and mortality indicators are higher.
- There is a number of hot spots where due to a very long time of pollution exposure the environment has suffered dramatic changes and the population health indicators has shown dramatic deterioration.
- In the last period of time (last 10 years) based on very drastic reduction of the emission levels because of the economical activity decrease, a number of health indicators as well as ecosystem affected has shown a trend of reduction on some disease outbreaks.

With reference to the water quality and the impact on ecosystems the complex analysis has shown that at present the Danube water quality is still generally satisfactory with 66.7% of water quality station number in the first class (as global quality according with Romanian standard 4706/88) and 33.3% of the station in the second class and some isolated cases for 1 or 2 water quality parameters in the third classed for a small number of station (<1%).

In the case of internal rivers the situation is more critical. In 1996 for example there were 49% of the water quality station (out of 320 stations in total) in the I class as global quality, 32% in the II class, 8% in the III class and 12% in the so called «Degraded» (over last limits). In connection with the last class (D) the most unfavorable situation were recorded in the catchement areas of rivers Ialomita, Prut and Vedea.

In the respective analysis of water quality and impact on ecosystems there were utilized data from National and Transnational databases from the years 1994 - 1997.

The major pollutants and detailed within the report are:

- Organic loads relevant by BOD_5 and COD measured data, which are affecting the dissolved oxygen regime with all the well-known impacts in the riverine ecosystems, like fish especially in the summer, etc.
- Nutrients loads, which has shown based on the monitoring activity results that the very high loads and concentrations in some places are in the continuous reduction in the last 10 years, but still are seriously affecting a number of rivers, reservoirs and Black Sea through the eutrophication of the respective water mainly in the summer and beginning of autumn.
- In a number of very specific areas the organic micropollutants, heavy metals and mainly the oil components pollution are in a very large concentration and loads. In respect with this specific areas of the rivers Sasar, Lapus, Somes within the Baia Mare county heavy metals and other pollutants associated with mining and siderurgical activity may be found in the overlimits concentrations. Also in the Prahova, Ialomita Rivers as well as Dambovita-Neajlov, Arges Rivers high petroleum hidrocarbon pollution and Dambovita-Arges as a result of Bucharest municipal wastewater discharge are relevant for high-polluted areas.

With reference to the hot spots identified and ranked there were found for 3 different type of activities and pollution:

- Municipal hot spots
- Industrial and mining hot spots
- Agricultural hot spots (point and some diffuse pollution sources)

As a general approach and methodology that was applied it was used a combination of National Environmental Action Plan methodology in parallel with recommended methodology for this respective National Review.

From the total number of 55 municipal discharges and 133 Industrial + Agricultural the hot spots were classified in categories in High, Medium and Low Priority hot spots.

As a result of this complex process, were identified 10 HP, 2 MP hot spots for Municipal; 4HP, 6 MP for Agricultural hot spots; 24 HP, 26 MP hot spots for Industrial category.

As can be seen from the hot spot locations on the Romanian map there are a number of areas with agglomeration according with municipalities, industries and agricultural objectives development during the time.

For some of these agglomerated areas it can be seen also that they are situated on some water courses or in the vicinity of these courses, which are crossing Romanian borders and at the same time are transporting the pollution creating the problem of transboundary pollution effect.

As examples can be mentioned: Bucharest, Galati, Braila, Tulcea, Timisoara, Resita, Arad, Turnu Severin, Oradea, Cluj, Dej, Baia Mare, Satu Mare, Iasi, Suceava, Bacau, etc.

With respect to the pollution reduction programme in a number of Action Plans the National targets and the respective pollution reduction measures were foreseen.

2. Description of the state of the Danube environment

Located in the southeastern part of Central Europe Romania is a country with abundant natural and environmental resources. Water resources include the Danube River and twelve tributary basins, as well as part of the Black Sea. Forest resources include 6.3 billion hectares of forest, covering 26 per cent of the country socio-economic surface, while farmland accounts for 40% of the country's territory. In addition to deposits of ferrous and non-ferrous metals, the country has reserves of oil, natural gas and coal.

Romania is also home to the 650,000 hectare Danube Delta, comprising the largest wetland in Europe. The Danube River represents a boundary for Romania with three countries: Yugoslavia Bulgaria - Ukraine. From the point where the Danube River enters Romania (the locality Bazias) up to the Black Sea, its water course length is 1,075 km, which represents 37.59% of the total length that is 2,860 km. 99% of the inland rivers belong to the tributaries areas of the Danube River Basin.

2.1. Water Resources

Romania's water resources are relatively poor and unequally distributed in time and space, being formed of surface waters - inland rivers, lakes and reservoirs, the Danube River and, of ground waters. The theoretical water resources of the *inland rivers and lakes* are estimated for about 40 billions m^3/year (with an average multiannual flow of 1,300 m^3/s), of which, in natural flow regime, only 5 billions m^3/year are utilizable, and, in actual river regime 13 billions m^3/year. Taking into account only the inland rivers, the specific resource is of about 1,700 m^3/inhabitant/year, a value relatively low as compared with other European countries resources. Romania takes 85 billions m^3/year from the Danube theoretical resources, but the possibilities of their use in natural regime are also limited because of the river navigable character. However, there is a major economic and technical difficulty: the water resources called "technically utilizable" cannot be used without the achievement of certain significant investments in complex and multipurpose water development works and schemes of the river basins and in the water treatment installations and plants because of the following constraints:

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

2.2. Biological Resources and Eco-systems

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

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

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

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

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

Romania's *flora* includes more than 3,500 species of plants, 350 of which are growing on mountainous plains and more than 800 in oak and beech tree forests. The Danube Delta is a special ecological system, with its approximately 1,150 species of plants. Of some 8,600 species of *birds* existing in the world, about 300 can be encountered in the Danube Delta; these represent approximately 78% of all such species in Romania and 3.4% of those existing in the world. About 300 species migrate from Asia, Africa and the polar zones. Mammal species - almost 100 - are very much like the other mammals existing in Central Europe.

2.3. Human Impact and Key Issues of Environmental Degradation due to Water Pollution

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

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

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

There are several potential adverse effects that might influence the aquatic eco-system including discharging of toxic substances, organic pollution, leakage, and pollution loads from reservoirs and sea, human activities, disturbed habitats. The Danube River basin’s environmental quality in Romania is considered as in other Danube countries being under great pressure from a diverse range of human activities.

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

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

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

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

3. Population development and water sector relevant characteristics

3.1. Analysis of Demographic Data and Projection of Urban and Rural Population in the Danube Catchment Area

All the information given for the country of Romania represents the same information for the catchment area of the Danube River system, as Romania is considered as totally included in this basin. According to the Romanian Statistical Yearbook of **1997,** that is the most recent official statistics publication, Romania is a country of 22,607 million people.

Population evolution of Romania between 1994-1996 (in thousands)

Population of Romania						thousands people
	1991	1992	1993	1994	1995	1996
TOTAL	23,185	22,788	22,755	22,730	22,680	22,607
URBAN	12,552	12,367	12,406	12,427	12,457	12,411
RURAL	10,632	10,421	10,349	10,303	10,223	10,196

The prognosis of the population between 2000-2020 (in thousands)

Year	Total Population	Active Population	Urban	Rural
2000	22,640	11,240	12,400	10,240
2010	22,730	10,915	12,480	10,250
2020	20,785	10,300	12,530	10,295

3.2. Estimation of Actual and Future Demand for Water

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

The share of population connected to centralized water supply systems is about 13.8 millions inhabitants. About 10.5 millions of people from urban area and 3.3 million people from rural area are connected to the centralized drinking water supply systems. *For the rural areas:* A number of 2,391 villages and communes have water supply systems (representing 17.76% from their total number). Only 346 rural localities are equipped with sewerage systems and generally the effluents are discharged into municipal wastewater treatment plants. The total abstracted volume, for both urban and rural areas is 116.3 m^3/s, out of which 70.3 m^3/s are abstracted from surface waters and 46 m^3/s from ground waters. The total amount of water delivered by the water supply system is about 2,588 millions m^3/year, out of which, 47.5% represent domestic use, 11.3% public use, 19.6% economic activities use and 21.6 represent the network distribution losses. For given number of population and the total water consumption, the estimates show the following values:

The average per capita specific water consumption in the *urban area*, at the country level, is about 513 l/inhabitant per day out of which: Domestic use - 294 l/inhabitant per day; Public use - 70 l/inhabitant per day; Economic activities use - 122 l/inhabitant per day; Network losses - 134 l/inhabitant per day. In the *rural area* the specific consumption is 172 l/inhabitant per day. The evaluation of the domestic water demand has been made accordingly with the Romanian standard 1343/1-91.

3.3. Estimation of Actual and Future Production of Wastewater

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

Because there is not an accurate registration of the wastewater discharge, it has been quite difficult to have a clear image over all aspects regarding wastewater.

The activity of the wastewater discharges has been achieved, in 1996, through public sewage, in 616 localities/ 216 towns and municipalities and 355 rural localities.

The total sewage network length is 15,290 km, which represent about 48.8 % from the total length of the streets. It is estimated that about 41% from the total population is connected to the sewage systems but this does not always mean that all the wastewater collected will be discharged through a wastewater treatment plant.

At the same time, in many situations in wastewater treatment plants, the wastewater coming from the industry is also processed and thus it is very difficult to evaluate the specific wastewater discharge.

3.4. Analysis of Health Hazards through Water Pollution and Unsanitary Conditions

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

1. *Environmental health problems* include both the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often indirect) on health and well-being of the broad physical, psychological, social and aesthetic environment, which includes, inter ail, water supply, sanitation, recreation, as used by The WHO, Regional Office for Europe.
2. *Water and sanitation facilities* are necessary, but not sufficient factors, to bring about improvements in health as improving health can only be realized by achieving significant changes in behavior.
3. *Health benefits* will come from water and sanitation programmes but require multiple interventions and time to address also the water quality problems.
4. Health hazards are influenced by a number of *factors*, only one of which may be water pollution and lack of sanitation. These factors include previous exposure, immunity levels, susceptibility, number of organisms required to cause the disease and, of course the ecological settings. Unless these factors are known adequate objectives cannot be established.
5. Measuring the environmental health impacts of water pollution and sanitation is only useful if it is based on *appropriate objectives* and uses correct indicators for measurement. In the health sector in Romania there is a general lack of knowledge of epidemiology, which results in inadequate goal setting, planning and measurement.
6. Moreover, the expert had to take into consideration how water, unsanitary conditions and lack of education were likely to impact on health in specific hot spots on the Romanian territory, as impact will vary depending on *literacy rate, existing morbidity and mortality, existing location quality and quantitative aspects of water resources* and current practice in the area.
7. The *benefits of health and socio-economic programmes are incremental*. Moreover, the greatest benefits are derived in the long term from a combination of water, sanitation and ecological education. The effects of *time* and the population *income* are very significant, too, especially in terms of improved nutrition of population.

The actual and future population potentially affected by water pollution should not be seen as associated with only one particular element, but with all components, which can influence the health.

The number of factors influencing the exposure of population and the environmental health problems and hazards are many and their interaction and ultimate effect of particular contaminants are hard to define, describe and evaluate for large groups of people with accuracy.

The direct consumption of water for human needs impact on the population health represents the key issue of this part of the report. Several aspects and process indicators and output indicators were taken into consideration:

a. Diseases and deaths due to unsafe intake of drinking water;
b. The easiness of the access to the reliable water supply source;
c. The drinking water quality statistics.

The quality of the natural waters is mainly influenced by both pollution sources: point sources such as wastewater discharges, or by non-point sources of pollution, such as the use fertilizers and pesticides. It is important to note that the use of fertilizers and pesticides in Romania has decreased dramatically over the last 10 years. However, the discharge of untreated or insufficiently treated wastewater is the biggest problem not only for the use of surface water for drinking purposes, but also, especially in a longer perspective, for the use of ground water. In Romania the ground water resources are still of an acceptable standard, even though limited areas have concentrations of nitrate exceeding the limits.

4. Analysis of Actual and Expected Impact of Economic Activities on Water Demand and Potential Pollution of Aquatic Systems

4.1. Industrial, municipal and agricultural activities

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

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

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

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

4.2. Solid Waste Disposal and Possible Soil and Groundwater Contamination

Comparing with 1995 there is an increase of industrial waste (about 0.06 millions of tons) and a decrease of urban waste (about 0.144 millions of tons). Significantly, the amount of waste coming from mining industry decreased from 288.4 millions of tons in 1995 to 49.5 millions of tons in 1996, mainly because of the diminishing of mining activities.

The important amounts of wastes have been generated by the energy production sector (19 mil. tons), mining sector (9.5 mil. tons - excluding sterile), food industry (9.3 mil. tons), metallurgical industry (7.2 mil. tons) chemical industry (5.2 mil. tons).

During 1996, in Romania there have been produced 53.7 millions tons of industrial waste, 6.696 millions tons of urban wastes, 3.8 millions tones of agricultural wastes and 0.2 millions tons of other wastes. At the same time, 49.5 millions tons of waste have been produced by mining industry.

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

Comparing with 1995 there is an increase in reuse of wastes with 1.47 mil. tons or about 2.67%. This process was recorded only concerning industrial wastes; municipalities had not concerns for waste re-use and recycling, their activities being oriented only for waste collection and definitive disposal.

The first option for the waste removal was definitive disposal. There are 893 disposal sites for the industrial wastes and 233 municipal waste disposal sites, in which the industrial wastes have been also dumped (0.84 mil. tons in 1996). Comparing with the EU countries the quantity of waste definitive disposed is very high.

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

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

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

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

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

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

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

5. Analysis of Water Quality Data and Description of Environmental Impact on Eco-systems and Human Quality of Life

5.1. Water Quality Data Critical to the Transboundary Analysis (Danube Water Quality Model)

According to the results obtained through a number of working programmes carried out within the Bucharest Declaration, EPDRB and so on, it is possible to assertion that at present the Danube water quality is still generally satisfactory.

The quality studies of the last 25 years have evidenced also the dynamic character of this stage, which even satisfactory being, as it was mentioned, may determine on evolution to worst stages in which water quality could be less favorable. This evolution is clearly brought into view by the values of the oxygen regime determinants, mineralization, and nourishment elements and by the saprobic bioindicators.

- This determinants annual mean values evolution shows that after 1970 important increases were recorded in the case of ammonium ions, nitrates and phosphates, showing that in 1990 they were 3 to 6 times higher than in the previous period. The mineralization recorded in the same period an increase of about 35% while the saprobic index exceeded the value of 200.
- the external contributions of mentioned salts and nutrients had as an effect the physico-chemical and biological modifications existing in the previous periods and the triggered organic synthesis process in the water body, characterized by higher nutrients recycling rates. The seeming consequences of these syntheses were reflected in the phytoplanktonic abundant development in the last years that reached the level 100 times higher densities than the values before 1970, with negative effects for the oxygen consumption.

Based on the spatio-temporal trend analysis of the concentrations as well as on the spatio-temporal trend analysis of the loads done on the data obtained in the period 1988 - 1996 within the Bucharest Declaration and within the National Water Quality Monitoring System for Romania a number of conclusions will indicate that the water quality parameters show through these data some critical situations in the Danube catchment area.

Based on these conclusions, a transboundary analysis using a unique and harmonized information tool like Danube Water Quality Model is obviously necessary.

The conclusions from the next Reports

1. "A synthesis of activities in the frame of Bucharest Declaration 1985 - 1997".
2. Synthesis on Romanian Water Quality in the year 1994, 1995, 1996 present those situations based on the analysis of the 8 years data.

5.2. Concentrations and Loads of Nutrients and Others Pollutants in the Danube River and Its Tributaries

The above mentioned analysis was done for a number of groups of water quality determinants as they are used to be analyzed within the two frames of the Bucharest Declaration organization and at the national level.

1. **Concentration analysis**

1.1. *Dissolved oxygen regime*

1.1.1. Dissolved oxygen in terms of saturation for Romanian stretch of the Danube is in a slight tendency of increase from entrance in the country to exit in the Black Sea, but the values are smaller than the values for upper part of the Danube (German and Austrian stretch). The tendency of decrease is in the segment of Iron Gates Reservoirs. The DO concentration is in the range of 7.0 - 11.5 mg / L with minimum values found after the confluence's with major tributaries or after the major direct discharges from the municipalities or industries.

1.1.2. BOD_5 - has values, which show the same variability in time with positive slope in same areas (Romanian - Bulgarian sector) and with an easy trend of decrease in the lower part of the Danube. This oscillation was identified in time and in space between 2.2 - 3.7 mg / L range, which was identified to be smaller in comparison with upper part, where the maximum range was 1.5 - 4.7 mg / L.

1.1.3. In the case of COD, there is not a very clear picture for this determinant, from the spatial trend point of view. For the Romanian stretch of the Danube, there is a trend of decrease, especially for the period 1989 - 1992 for upper part of this river and with oscillation of ± 1.5 mg / L for the downstream part. The overall range for COD is 2.7 - 6.2 mg / L, being lower in comparison with BOD_5 in some cases.

1.2. *Nutrients situation*

1.2.1. In the case of N, only the mineral nitrogen was routinely analyzed and the most significant species were identified N - NO_3 with about 70 - 75 % contribution (at the Danube pH), N - NH_4 with about 10% and N - NO_2 with less than 2%. Through the special researches, the mineral nitrogen was identified for the Romanian stretch and existing conditions to be at about 15 - 20% N in the N total.

In those conditions, the N_T is representing the mineral total nitrogen in the analysis done in this report, and conclusions based on monitoring data.

In general, the tendency in spatial analysis was slightly increasing within the range of 1.5 - 3.6 mg / L with a factor of v_{max} / v_{min} = 2.4, in which the maximum values for the Romanian stretch were identified lower after the Iron Gates in the area with tributaries from both parts left and right.

In longer time, the trend analysis has shown that the tendency was continuos slightly decreasing from 1988.

1.2.2. In the case of phosphorus, the maxim range identified was in the spatial and temporal trend analysis (1988 - 196) and in Romanian stretch between 0.1 - 0.53 with a ratio v_{max} / v_{min} = 5.3, which is the highest for the list of investigated determinants. There is an obvious trend of P_T decrease in time with a higher ratio than in the case of N_T, which is reflected also in time increase of N_T / P_T ratio. As for nitrogen, also in the case of P_T, the maximum concentration of P_T belongs to the lower part of the Danube River. So it is anticipated that the N_T / P_T to be higher in the upper part of the Danube in comparison with the lower areas. In time, the same trend analysis has shown that the tendency was of continuous slight decrease starting from 1988.

1.3. *Other pollutants in the Danube River*

1.3.1. As for the other pollutants, the organic micropollutants (some of them like DDT, Lindane, Atrazin) and heavy metals were analyzed, but rarely associated with the solid phase from the aquatic environmental. Also less information is obtained on bioavailability and bioaccumulation of these pollutants.

Different trace elements show different distribution patterns, indicating inputs from different sources and different places with accumulation in the sediment and / or biodata, the Iron Gate 1 can be considered from this point of view a chemical pollutants reservoir also with the possibility to release the respective pollutants from the sediments.

The trend evolution in time and space after 1988 shows that the values of the measured data are in slight decrease, which can be explained only because of the economical activities that has dropped in the lower Danubian countries.

1.3.2. Petroleum hydrocarbon shows decreasing pollution, but still a significant impact can be seen mainly because of the more frequent accidents, spillages and discipline abatement in the navigation on the Danube.

2. Situation in the Danube River and main tributaries according with national standards

2.1. With reference to the internal watercourses, which are 98% part of the Danube catchment area, the same trend of evolution in time and space was identified in the last years, after 1989 and this one shows a slight decrease of pollution with favorable reductions of concentrations for most of the pollutants. But in comparison with Danube River, which has presented in 1996 66.7% of water quality stations in the first class as global quality (in accordance with Romanian Standard for Water Quality Assessment, no 4706 / 88) and 33.3% of the stations in the second class as global quality, in the case of internal rivers in 1996, there were 49% of the stations (out of 320 stations in total) in the first class as global quality, 32% in the second class, 8% in the third class and 12% in the so called «Degraded». In connection with the last class (D), the most unfavorable situation was recorded in the catchment areas of the Ialomita, Prut and Vedea Rivers.

2.2. The same kind of assessment and categorization of the rivers according with the same standard (4706 / 88), but with reference to the length of the affected rivers:

- for the length of the Danube River, there were in 1996: 58% in the first class of global water quality, 32.1% in the second class and 9% in the third class, but only for 1 - 2 water quality parameters. This means in length 746 km (58%) first class, 413 km (32%) second class and 128 km (9.9%) third class;
- for the internal water courses, out of 20,862 km length, which is monitored, there are 11,162 km (53.5%) in the first class, 6285 km (30.1%) in the second class, and 2238 km (10.8%) in the degraded class.

The trend evolution in time for internal river has shown an increase of the percentage and kilometers of the rivers situated in the first and second class and a decrease of the percentage and kilometers of the rivers situated in the third and «D» classes. This is illustrated by the next figures in percentages of stations number and percentages of km from the total length monitored:

	I	II	III	D
1993	39.1/ 54.3	26.1/19.7	13.8/0.9	21.0/15.1
1994	45.3/50.9	34.1/29.7	7.2/8.2	13.4/11.2
1995	48.1/51.9	29.1/26.5	8.4/8.5	14.4/13.1
1996	49.4/53.5	31.7/30.1	6.6/5.7	12.3/10.7

The critical types of pollutants are the same like in the case of the Danube River, but with the problems being more acute at the same areas because of the long term of exposure of the water environment to a number of the above mentioned toxic substances in parallel with the low dilution and the rivers power of absorption, for a number of pollutants.

3. **Load Analysis**

As for the concentrations, the spatio-trend analysis of the loads was made also taking into consideration the trend evolution for determinants and the trend evolution for the stations.

In space for all analyzed determinants from Danube stations, there is an obvious trend of increase of the loads from upstream to downstream. In time, the extreme maximum values correspond to TDS (65,000 kt for Reni in 1996) and the minimum ones to phosphorus (92 kt for Gruia in 1988).

3.1. *Dissolved oxygen regime*

3.1.1. BOD_5: For this parameter, with the exception of Iron Gate reservoir stretch a tendency of decrease was recorded, for the other stretches the slope of the hoods was constantly increasing in space but with a small slope of decreasing in time (from 1988 till 1996). Based on the respective analysis for BOD_5 the results between maximum and minimum ratio in the period of time selected show values between 1.0-1.1, which prove the good self-purification process in the area. Only one exception was in 1988 when this ratio have had a peak of 1.4. An absolute figures for example, for station Bazias, BOD5 load has increased from 200 KT in 1990 to 350 KT in 1996.

3.1.2. In case of COD this parameter has presented quite the same picture as for BOD5. The ratio between maximum and minimum-recorded values for COD lodes is 10.5. However in comparison with BOD5, for COD lodes spatial trend there is a specific high decrease between Bazias (entrance in the country) and next station. Between those two stations there is Iron Gate reservoir located.

As it was seen in the use of concentration trend analysis, COD is not relevant as a pollutant for the Danube River, all the values being less them 1,0 in the ratio between years [n+1/n]. However after the minimum values record in 1991-1992, a slight trend of increase of this ratio was detected after 1994.

3.2. *Nutrients situation*

3.2.1. The total mineral nitrogen (N_T) loads spatial trend has a continued increase from upstream to downstream with some maximum of 130 KT (between Bazias and Reni) in 1991 and 195 KT in 1992. Before these 2 years the loads has decreased from one year to another (90 KT in 1988, 80 in 1989, 45 in 1990) and also after 1992 120 KT in 1993, 15 KT 1994, 75 KT in 1995 and 92 in 1996.

3.2.2. In the case of total phosphorus (P_T) the spatial curve for these loads is very similar like it was for N_T. The influences of tributaries downstream of Iron Gate reservoir are more specific for P_T than for N_T. A trend of decrease appears however much more in the case of P_T than for N_T at the entrance stretches in the country than for the lower stretches before Danube Delta and Black Sea.

In time the P_T loads have had a continued decreasing trend from 22 KT 1988 (between Bazias - entrance in the country and Reni – entrance in Danube Delta) to 6.0 KT in 1996.

3.2.3. A special analysis was made for N_T/P_T ratio in time and space. This ratio depends by N and P distribution, when for all the stations is an obvious trend of P_T time decrease with a slope much more higher than in the case of nitrogen. On the other hand from the spatial trend point of view both functions are increasing N_T= f(d) and P_T =f(d) but with higher slope for the N_T which makes that N/P ratio to decrease from up to downstream. This had a number of variations in time and space, of the N_T/P_T like:

Years	Bazias	Reni
1991	13.9	11.8
1992	14.8	18.0
1993	16.2	16.0
1994	20.6	14.3
1995	17.1	15.1
1996	23.0	21.0

Of course, all these values of N_T/P_T ratio, as it is well known, have negative effects on the marine ecosystem. In most of the cases this situations creating the condition for noxious algae species to increase and the vulnerability of the ecosystem for damage by "intruder species» from other ecosystems has increased as well.

As for the tributaries the loads have a much larger variability, which is following mainly the concentration in the evolution trend.

5.3. Transboundary Effects of Pollution

As can be seen from the Romanian map of hot spots the location of the respective hot spots creates a number of areas of agglomerations according with municipalities, industries and agricultural objectives development during the time.

For some of this agglomerated areas, it can be seen also that they are situated on same watercourses, which are crossing Romanian borders, and at the same time are transporting the pollution from one country to another creating this problem of transboundary pollution effect.

This transboundary effects of pollution in the case of Romania has two different aspects:

- - one, in which Romania is the importer of pollution through Danube River, Tisa River, Siret and Prut;
- - second, in which Romania is the exporter of pollution through Somes, Cris Rivers, Mures, Barcau, Bega, Timis, Barzava.

As can be seen in the full report (part C) of this National Review, for Romania, the number of hot spots analyzed is large and very diversified.

As it was mentioned in the previous chapters, major problems of transboundary pollution transport are created by organic pollution from municipalities, nutrients from municipalities and industries plus agriculture, heavy metals and a large number of organic and inorganic chemicals coming out from large industrial platforms. As examples can be mentioned: Bucharest, Galati, Braila, Tulcea for east and south-east of the country, Timisoara, Resita, Arad, Turnu- Severin for west and south-west part of the country, Oradea, Cluj, Dej, Baia Mare, Satu Mare for west and north-west and Iasi, Suceava, Bacau for north and north-east part of the country. There is also a number of hot spots in the middle part of the country, which have also serious impact on the water environment and which are included in the Final Report of National Review.

6. Identification, Description and Ranking of Hot Spots

The general approach and methodology that was applied to update, evaluate and rank Hot Spots was based mainly on the methodology applied within the National Environmental Action Plan (NEAP = PNAPM) and in parallel on the recommended methodology. This methodology is described in Chapter 6.4. What should be mentioned from the beginning is that, the first lists of Hot Spots that were used for analysis, evaluation and ranking were the lists of municipal and industrial main discharges (covering 75 % from total national discharged volume within the country in the Danube basin area), lists produced by the EMISS - EG in the frame of the Environmental Programme of the Danube River Basin (EPDRB).

From the total number of 55 municipal discharges and 133 industrial (including agricultural) discharges based on the selection from other national or international assessment (previous SAP, NEAP - 95, NEAP - 97 and so on) these two groups of Hot Spots were classified in Municipal Hot Spots, Agricultural Hot Spots and Industrial Hot Spots and than based on the assessment of values for loads, impact in the receiver, problems created in the area, affecting of other users and/or ecosystem, those Hot Spots were categorized in High, Medium and Low Priority Hot Spots and in each of those categories (less for Low Priority) the ranked place were identified.

As a result of this complex process were identified and described 10 High Priority and 2 Medium Priority Hot Spots for Municipal category, 4 High Priority and 6 Medium Priority Hot Spots for Agricultural and 23 High Priority plus 26 Medium Priority Hot Spots for Industrial category.

For all of the above mentioned Hot Spots, the ranking procedures were applied, and in a number of 3 Ranked position Hot Spots tables, the respective Hot Spots were placed.

6.1. Municipal Hot Spots (M-HS)

There are 545 localities provided with a centralized sewage system in Romania. Out of this number, 258 are cities and 287 villages. There are 9.1 million people connected to a sewage collection system out of which 8.7 million live in cities. The total amount of wastewater flowing directly, or via wastewater treatment plants is 80 m^3/s. Only 74 percent of this flow is treated. Out of 60 m^3/s flow that is treated, 11 m^3/s is treated only mechanically and 49 m^3/s flows through the biological steps. There are 204 wastewater treatment plants in the country.

There are 17 cities belonging to 11 counties placed along the left side of the Danube River, discharging directly about 537 thousand m^3 wastewater per day, that is 39.5 percent of the total flow of wastewater discharged.

About 470 thousand m^3 per day of municipal wastewater is discharged untreated into the river.

Out of the 17 cities along the river, 3 cities are harbors suitable for sea ships. In these cities (Braila, Galati, Tulcea) are living about 670 thousand inhabitants.

No harbor along the river is provided with facilities to take over the wastewater from the ships.

In the analysis of the respective hot -spots there were used data obtained from the monitoring activity within the Water Quality National Monitoring System and in some cases due to lack of data the theoretical agreed approach was applied. According to the calculations based on the discharge per capita per year of 900 g P and 3,200 g N and taking into consideration the population connected to the sewage system as well as the effects of the existing waste water treatment plants, the loads of the municipalities in the Danube and in the tributary areas of the Danube River are presented in the National Review.

The Municipal HS group was organized in a cumulative table with a total of 55 towns included. From this table based on the selection criteria mentioned in the previous chapters, a number of 3 groups and attached tables were considered and organized for the second heading of ranking as High Priority (HP), Medium Priority (MP) and Low Priority (LP). The respective tables (Annex Table 2.2.1.1) have about 55 columns included in 4 pages and the information content is referring to the:

- number of HS (unique in all tables and maps for one HS);
- location as name of the town and discharges;
- receiver river/catchment area;
- previous list of HS and the place of HS on this;
- raw water load;
- current treatment;
- current capacity;
- total load discharged into receiving waters (t/year of BOD_5, COD, N, P and others if it is the case)
- final capacity proposed or estimated;
- information about possible construction of new or enlarging wastewater treatment plant (WWTP);
- estimation of remaining pollution after new development;
- data about effluent and receiver flow;
- water quality category (I, II, III and D = degraded, according with Romanian
- Water Quality Standard 4706/1998) and also the name of the sampling stations upstream and downstream of the respective H.S.;
- water quality indicators affected in receiver by the respective HS;
- information about seasonal variation, root causes of emission (if exist);
- downstream users of water from the discharge point of respective HS;
- characteristic of problems created in receiver.

Based on the information gathered and organized in the tables mentioned above the ranking procedures was applied.

6.1.1. High Priority (HP-HS)

From the number of 55 towns/discharges selected as covering about 75 % from the total municipal discharges (condition imposed to the EMISSION/EG when they have organized the solution of respective emissions) in this category were selected 10 HS (Annex Table 2.2.1.1.) Out of these, 7 were included and still are included in near all previous lists of HS, as well as in the last revised version of National Environmental Action Plan (PNAPM) finalized in December 1997. Based on the ranking procedures applied in this, the High Priority HS ranking is presented in the table 2.2.1.2. In these tables are included also information about transboundary effects of respective HS.

In the Annex Tables 2.2.1.1, 2.2.2.1., 2.2.3.1, columns 8, 9, 10, 11 indicates No treatment (8), Mechanical Treatment (9), Biological Treatment (10), Denitrification step (11) and Phosphorous reduction step (11). The concept of these Tables and content as well as the columns like 0, 1, 2, 7, 13, 14, 15, 16, 17, 18, 22, 23, belong to the Expert Group of Emission Inventory (EMISS/EG) and it was agreed to be utilized by all experts from the Danubian countries (except maybe the R.F. Yugoslavia, which is not included yet in the EPDRB activity)

There are remarks in the National Review- part D, which are referring to the works that are necessary to be done for to improve the treatment facilities. These notifications are based on the agreement from the EMISS/EG meeting (third and fourth) and they have this meaning:

r – rehabilitation, upgrading
e – extension
n – new WWTP
FS – Feasibility Study (necessary, in elaboration, approved)

Also there are included the approved values of flow from the permit, for the respectively treated discharges or without WWTP as it is the situation

The seasonal variation is shown as two indicators included, and which are referring to the «flow» and «loads» of the municipal discharges of the respective towns. For loads the numbers from the tables are referring to the seasonal variability around the average values of some parameters (BOD_5, BOD, N, P), which are measured in the water discharged.

For the root causes of emission, there are no more explanation because the reality is reflected by the figures presented in the previous columns, and which are in fact steady state situation for more than 10 years.

The transboundary effects, which were identified for those HS are, that the mixed water of the receivers with quality of water affected by the respective Hot Spots discharged are going in the international waters of the Danube or tributaries. This is because near H.S. from High Priority List are located closed to the borders or near the points where the receivers are crossing the borders. It is the case of Braila, Galati, Bucharest, for the Danube and Zalau, Craiova, Resita, Timisoara for the receivers tributaries going over the border short after receiving the wastewater from those towns.

6.1.2. Medium Priority (HP-HS)

From the total number of 55 towns for the Medium Priority (MP) were selected 2 towns (Annex Table 2.2.2.1.) After ranking procedures the Annex Table 2.2.2.2. is presenting the result. From this category there are no one with transboundary effects of pollution.

6.1.3. Low Priority(LP-HS)

In this category are included the rest of 55 hot spots after extraction of HP and MP hot spots. For this category the data and information included in the Review are not so complete and because of that for this group there was no ranking procedures applied.

6.2. Industrial Hot Spots (I-HS)

The cumulative table with those HS contains also the agricultural HS, as it was produced by EMISSION - EG. The total number of HS contained in the cumulative table is equal with 131 HS. From this table, more than 100 HS were used for analysis and ranking in the group of I-H.S.

The available data and information requested and found were included in the National Reviews tables from HP & MP hot spots categories and less for the LP hot spots, because of the lack of reliable information.

6.2.1. High Priority (HP-HS)

In the Annex Table 2.4.1.1. are included all industrial HP - HS selected based on criteria mentioned in the National Review-part D and then based on the ranking procedures they have got the places from the Annex Table 2.4.1.2. From the total number of 23 HP hot spots, 12 are included in the National Environmental Action Plan (PNAPM) last version 1997. From the total 23 HS, 11 have been identified with transboundary effects.

6.2.2. Medium Priority (MP-HS)

In the Annex Table 2.4.2.1. are presented all data and information referring to the 26 HS selected in this category. Based on the ranking procedures, Annex Table 2.4.2.2. was produced with the places of HS within this category. Out of these 26 HS, 6 have been identified with transboundary effects.

6.2.3. Low Priority (LP-HS)

In the table 2.4.3.1. are included the remainder HS from this category (IHS), which have not been ranked because of the lack of minimum data for a good assessment.

6.3. Agricultural Hot Spots (AHS)

Taking in the view that a new chapter (3) was included in the content of the Part C of the National Review referring to the «Identification of Diffuse Sources of Agricultural Pollution», a large volume of information about this activity was included there. There are statistical information about land utilization , crops production, fertilizers and chemicals used, as well as animal production, surface of land used for this and so on.

Nearby those data, with reference to the point source of pollution from agriculture, some data and information were collected and entered in the tables corresponding to this category (table 2.3.1.1.).

As it was organized in the case of municipal HS, also it was done in this case of agricultural HS. The total number of agricultural HS selected is 28. Tables proposed by EMIIS/EG and used for agricultural HS and industrial HS have a smaller number of columns (34) because for these 2 categories, there were no data available referring to the extensions or new constructions of WWTP from those categories. Some of the columns with requested data are included.

6.3.1. High Priority (HP-HS)

From the total number of agricultural HS (28), there were selected 4 High Priority (HP) hot spots. Two of them are also included in the list of hot spots produced for National Environmental Action Plan (PNAPM) last version 1997. Those are HS Nr. 113 and 22, which are on the first and the second place in Annex Table 2.3.1.2. with ranked A - HS - HP. About transboundary effects of the H.S. from this category 2 of them were identified with this impact.

6.3.2. Medium Priority (MP-HS)

In this category - MP - were selected 6 A- HS (Annex Table 2.3.2.1.). After ranking the places of this HS can be seen in the Annex Table 2.3.2.2. Out of this 5 HS have transboundary effects of pollution.

6.3.3. Low Priority (LP-HS)

All HS, that were not included in the categories HP & MP are included in this last one (LP) and the information referred to those sources is less sufficient, because of the lack of reliable data to characterize better this agricultural units.

The code numbers for agricultural and industrial HS are obtained from a unique cumulative table (as it was done by the EMISSION - EG expert based on these procedures).

6.4. Ranking Criteria under Consideration of Transboundary Effects

More details about those criteria's applied for all groups of Hot Spots were presented in the Chapter 5.3 of the present Summary.

7. Identification and Evaluation of Pollution Reduction Measures

7.1. National Targets and Instruments for Reduction of Water Pollution

Conceptually, the strategic directions, which are followed up with the concrete structural and nonstructural projects and generally, the measures proposed for pollution reduction are:

- Gradual development of municipal wastewater treatment capacities;
- Gradual development wastewater treatment in agricultural sector;
- Gradual development wastewater treatment in industrial sector;
- Integrated management of water resources;
- Abatement of risks to accidental pollution and natural calamities;
- Ecological reconstruction;

All these issues have been regarded in transboundary context.

The main instruments intended to be used for achieving the targets are:

- Legislation (by harmonization with EU legislation);
- Economic instruments;
- Technical measures (by implementing the structural and non-structural projects);
- Education and public participation;
- International co-operation;
- Bi-and multilateral countries arrangements;

7.2. Actual and Planned Projects and Policy Measures (List of Ongoing and Planned Projects in Annex)

- Preventive measures: emission control projects, treatment plants
- Remedial measures : rehabilitation of wetlands, flood plain control,

There are 50 projects, which are to be implemented in short term: municipality hot spots - 15 projects, agricultural hot spots - 19 projects and industrial hot spots - 16 projects.

Out of 50 short-term projects - 32 are structural ones and the rest are non-structural projects.

The main items approached with the structural projects are related to legislation, institutional development and regulation, economic analysis, the adoption of «Aquis» Programme, reporting the requirements of international conventions and other subjects concerning the adherence to EU.

The total cost of implementation of high priority projects has been estimated to be 297 million USD. Out of this amount, 27 percent are provided for municipality hot spots, 14 percent - for agricultural hot spots and 59 percent - for and industrial hot spots.

The actual exchange rate of 8480 lei per USD (Mai 1998) has been taken into account.

On the whole, 96 percent of the amount of money proposed to be allocated for short-term projects will be directed to the structural projects and 4 percent to the non-structural projects. Generally, the non-structural projects are supposed to be financial by Government (State Budget) and the structural projects by the titleholders.

Generally, one can say that in Romania there is a certain institutional capacity in the field of preparation structural projects for water pollution reduction and less experience in preparing non-structural projects.

External support consisting in technical and financial support is needed on the following issues:

- Non-structural projects;
- Know-how technologies (BAT) in advanced water treatment unit operations;
- Institutional capacity building;
- Tendering process in international projects;
- Training (e.g. new methods for analysis);
- assistance for procurement of new equipment.

Special electric regulation items, as well as laboratory equipment are needed. There is a strong need of measurement equipment in existing and future wastewater treatment plants.

Legislation issues in the context of transboundary conditions, ecological reconstruction, preventing the downstream effects of accidental pollution and natural calamities are subject of projects included in the list of high priority projects which are supposed to require international co-operation.

7.3. Expected Results of Planned Measures and Projects with Particular Attention to Transboundary Effects (quantified)

- Nutrient emissions,
- Hazardous substances,
- Microbiological contamination,
- Wetlands rehabilitation,
- Sedimentation and hydrological regime.

By implementing the short-term projects (high priority) the reduction of pollutants discharged will be: 28.80 kilotons of BOD_5, 2.8 kilotons of nitrogen and 0.62 kilotons of phosphorous.

By implementing the medium term projects the additional reduction of pollutants will be: 58.4 kilotons of $BOD_{5,}$ 5.73 kilotons of nitrogen and 1.25 kilotons of phosphorous.

By implementing the short-term projects the reduction of heavy metals in the wastewater discharged is referred to the transboundary rivers. About 97 percent of lead and 99.4 percent of zinc of the existing discharge of the respective companies defined in the projects proposed will be reduced.

About 45 percent of phenols estimated to be discharged by the companies taken in a view with the shot-term projects proposed are discharged in the transboundary rivers, while cyanides almost one hundred percent are discharged directly into the Danube River. By implementing the projects proposed about 50 percent of cyanides and 94 percent of phenols discharged by the respective companies are expected to be reduced.

8. Analysis of National Financing Mechanisms

8.1. Policies for Funding of Water Sector Programmes and Projects

Due to the size of investment, the water administration is a field, which needs a short and mostly long term planning, the investment being necessary before the water crisis occurs.

The international practice shows that even if water administration works belong to the public sector, the costs are widely distributed for all the beneficiaries. In USA, the most privatized country, the water protection works, the water course regulation, complex works (water supplies, industry, energy) are established and approved by the Chamber of Representatives and are financed by the federal budget. In order to speed up the approval one seeks to reduce the funds requested from the federal budget by the participation of member states budgets, local authorities or even private companies. The financial resource will be limited by a certain period of time due to the social and economic changes and to the transition costs; the budget investments, for the public sector will be also limited, and out of this, just a small part could be allocated for water administration. The consequences of this aspect are the followings:

- Any new economic development should previously check whether it is possible or not to do the appropriate water administration investments;
- The new consumers should be located only in areas with available water resources;
- The available funds for the water administration will have to be used as efficient as possible;
- Involve local beneficiaries and economic agents to cover the costs.

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

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

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

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

The sector evolution in the period 1999-2000

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

At the same time the investment effort will ensure:

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

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

8.2. Actual Cost and Price Policies

In 1990, it was approved the Government Decision no. 1001/1990, regarding the set up of a unitary System of payments for the products and services of waters' administration , in order to improve the role of the economic instruments in the rational administration and the protection of the waters' quality and the setting on economic principles of the prices and tariffs system in the waters' administration.

« In view of users' stimulation to reduce the water demand and the improvement of the waters' quality, in the field of waters' administration, in accordance to the dispositions of the present decision, the prices and the tariffs for the products and services of waters administration, and, also, penalties for infringing the legal dispositions concerning the waters' quantitative and qualitative use.»

The prices and the tariffs were sized in order to totally cover the exploitation, maintenance and repairs expenses of the National System of Waters Administration and a part of hydro-technical works' amortization from administration, defense works against the floods being exempt of amortization in conformity to the law.

The implementation of the new prices system was difficult, because the users hardly accepted the idea that **the water is a good with value.**

In the prior system only those, who took water directly from the accumulation lakes paid the water, at differentiated prices on every lake in part.

The impact appeared on three components:

- the prices for the taken water;
- the tariffs for evacuation of impure substances in the water courses;
- the penalties for non-respecting the regulation acts or commercial contracts' dispositions.

Aim

The aims for which the prices system was introduced were largely reached, and namely:

- organic integration of the waters' administration activity in the national, social and economic circuits;
- expenses recovery of the exploitation and maintenance in the respective field, without financing the infrastructure, through the distribution of the financial efforts to beneficiaries;
- change of the beneficiaries' behavior in relation with the waters➜ saving and protection;
- supply of some conditions of economic nature and environment's protection in order to develop the totality of activities in relation with the waters.

After the introduction of the payments unitary system, the users reduced the water demand.

As it the same time there were some transformations in the economy, it is impossible to establish how much from the taken water's reduction is due to the payments' introduction effects and, also, to the diminution of the users' production.

Effect

The effect on the beneficiaries is felt through the following aspects:

Positive aspects

- more correct dimensioning of the water demand, although generally speaking, the demand is bigger than the effective taking;
- reduction of the losses in the water internal circuits in the process of production and water's internal new circulation.
- increase of the interest for the volumemetre install, for not to pay bigger volumes than those effectively taken;
- improvement of the water quality in very polluted zones.

The effect of the taking's reduction:

- Costs reduction of the wastewater taking and treatment ➜the reduction of the product's price;
- Reduction of the evacuation and, consequently, of the impact on the drainage channel. But if the purifying stations are not equipped with new technologies, the effect is low.
- Reduction of the transported water volumes ➜ lower costs in the process of networks' rehabilitation ➜ reduction of the product's price;
- Through the internal new circulation of the water. The total costs with the water reduce
  - reduction of the product's price or
  - production increase at the same costs with the water.

Negative effects

- as their aim was to realize bigger production and competitive products, they firstly made investments in the technology of product fabrication, and after they obtain a bigger profit, they will improve, also, the purifying stations of the wastewater or in the internal system of water's administration;
- the costs with the water of the companies, although represent a low percentage from the total of the costs, 1÷2%, it is very hard to be paid to the units of waters' administration.

The payment to the suppliers is made with priority for energy, gas, raw materials, so on, and finally the water.

8.3. Actual and Planned Public and Private Investments for Water Quality and Wastewater Management Projects

The Water Administration Strategy has three variant for investment: 45340, 67827 and 108144 billions lei corresponding to a minimal, medium and maximal option.

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

The largest part of the 29000-km length of distribution networks is between 30 and 70 years old and is made of unprotected steel. This lead to water leakage in the network up to 40-45%. In comparison, these leakages in other countries are 5 to 8 times smaller: Netherlands - 5, France 10%. Only in 1994 there was a leakage of approx. 640 millions cubic meters of water (20 cubic meter/s), which did not reach the consumers, but was paid by them with approx. 130 billions lei. A similar situation is present for the industrial water networks.

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

- to supplement the water resources in such a way that those losses be covered by new works to assure resources;
- the rehabilitation of centralized water systems.

The first variant - which foresee the rehabilitation of 15 % of the length of the network in the next 15 years, the value of the works is 25570 billions lei, whilst the value of works for the coverage of water losses need investment of 20090 billions lei.

The second Programme Variant - 24 % of the network would be rehabilitate in 10 years, with an investment effort of 43833 billions lei, and respective 50225 billions lei.

In the third variant, 41 % of the network will be rehabilitated with 70315 and respectively 87666 billions lei.

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

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

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

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

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

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

   In this context, the Programme has three variants of volume of works in view of water quality improvement, by nominating some water treatment plants and even technological process modifications. In the third variant of the Programme the investments are (over 10 years) 4575 billions lei. These works will enable 8000 l/s of first quality water for the consumers, which, if achieved as a source from somewhere else would have need 5935 billions lei, 700 km of connection pipes and 2009 billions lei more. At the treatment plants level the economies (consumables, various materials)would reach 6.9 billions lei in 10 years.

   As conclusion, the third variant with an investment of 4575 billions lei, replace one of 7591 billions lei, needed in the case of other equivalent water resources.

c. In Romania, just 19.3 % of rural population have centralized water supply access, much below the European average. Considering that, the Programme foresees (together with necessary rehabilitation of existing networks), an increase of connection degree of 30 % in year 2000 and 40 % in 2005, but still bellow the European average.

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

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

- water supplies system rehabilitation - 65.02 %;
- rural water supply - 5.04 %;
- water supply for urban supply systems - 4.67%;
- floods prevention - 4.44 %;
- water quality protection 4.19 %;
- ecological and health requirements 0.35 %
- irrigation water sources 6.62 %;
- hidroenergetic works 9.6 %;
- navigation works 0.03 %;

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

Out of the total investment, the state budget will cover 35632 billions lei, the local budgets 56617 billions lei and other economic agents 15903 billions lei.

For the period 1995-1998 the public investment programme in the field of water quality and quantity management the state budget covered 2332 billions lei.

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

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

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

9. Development of national Pollution Reduction Program and Investment Portfolio

9.1. Project Identification, Description and Cost Estimation

- Actually retained and new proposed projects for pollution reduction (Summary Table and Annex),
- Investment portfolio for priority projects (hot spot ranking) with indication of national funding sources and complementary funding needs (Summary Table and Annex)

9.2. Institutional Planning Capacities in Public and Private Sectors

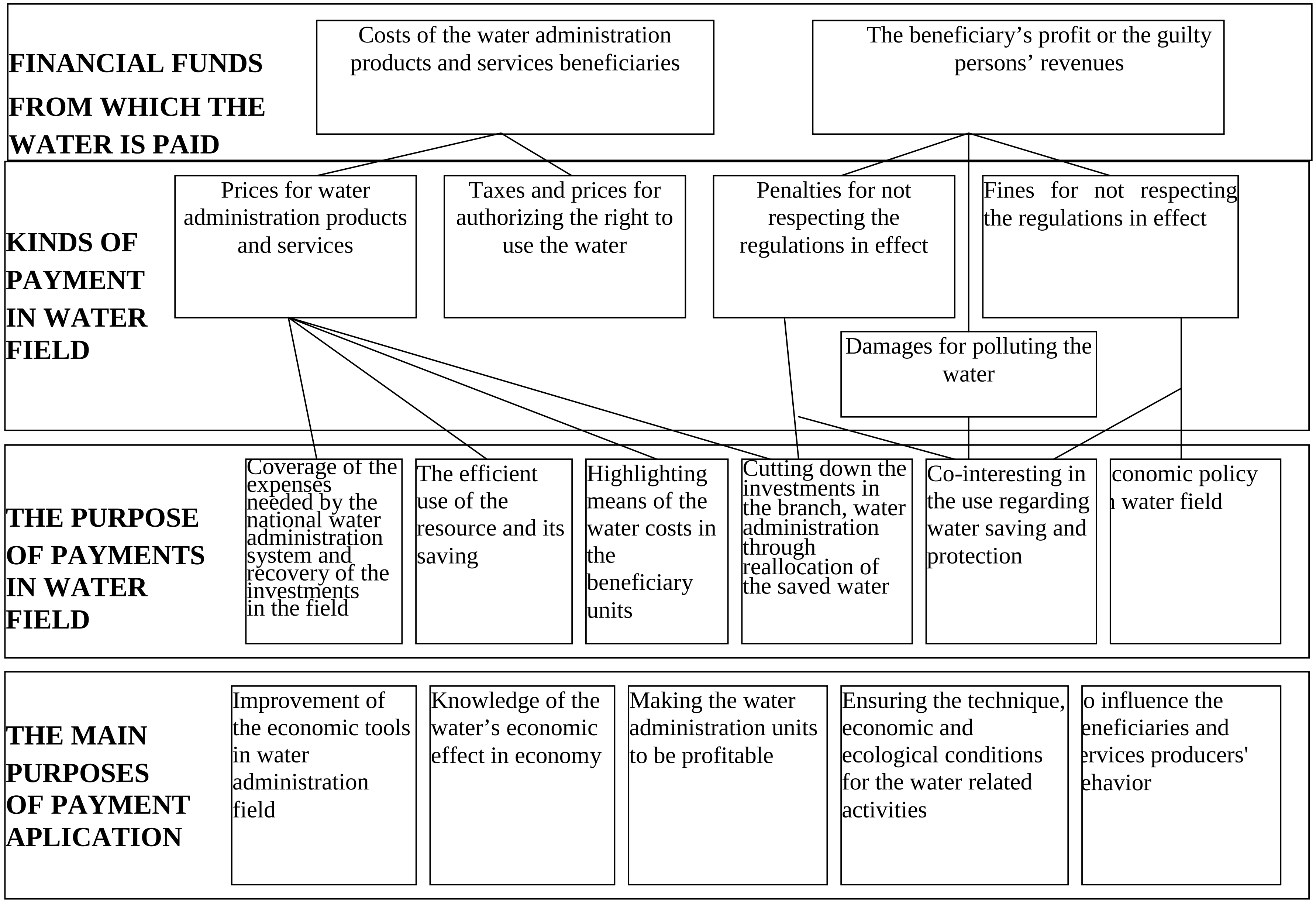
- To assure best available technique
- To assure best environmental practice

9.3. Implementation Capacities in Public and Private Sectors

- National construction companies,
- Cooperation with foreign companies,
- Procurement of equipment and materials,
- Political engagement and ability for implementation of policies and control of legal measures.

Annexes

Funding mechanism for water sector programs and projects



Hot spots - MUNICIPAL
HIGH PRIORITY

Tabel 2.2.1.1.

Ser. No	Discharger/ Location	Receiver River/ Cachement area	PREVIOUS LISTS OF				Raw water load (TPE)	Curent treatment					Curent capacity of WWTP (TPE)	Waste water volume discharged Tm³/y	TOTAL LOAD DISCHARGED INTO RECIVING WATERS T/year							FINAL CAPACITY (TPE)
			SAP 93	PNA PM 95	Tab 2.2	PNA PM 97		No	Mu	Bio	N	P			BOD	COD	N	P	PATHOGENS	OIL	OTHERS	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
5	Braila	Danube / Danube	5		5	41	230.0	x						27,740	4886		952	223				
7	Iasi	Bahlui / Prut	18	1	19		310.0		x	x			450	53,600	1750	1930	368	60.4				450
17	Galati	Danube / Danube	16		17	42	300.0	x						38,250	6428	6660	1044	293				
28	Craiova	Jiu / Jiu	27	59	29	44	283.0	x						43,200	6071	6080	985	277				400
30	Resita	Bârzava / Bega-Timis		11		45	35.1	x						5,986	1475	1780.09	235	71.7				
31	Resita	Bârzava / Bega-Timis					61.1		x				100	10,420	162.97	284.47	122.52					150
32	Timisoara	Bega / Bega-Timiş	28	6	31		217.0	x						70,618	3241	3952	676	97.7				
33	Timisoara	Bega / Bega-Timiş	28	6	31		88.0		x	x			194	28,650	1149	1453	316	75				340
34	Deva	Mures / Mureş				47	70.2		x				75	22,238	1026.3	1780	186.2	52.4				150
43	Zalau	Zalău / Crasna				43	35.2	x						8,782	499.6	563.47	162.3	45.6				
44	Zalau	Zalău / Crasna		19			35.1		x	x			50	8,610	66.14	222.64	20.35					80
52	Campulung Muscel	r. Târgului / Arges	8	13	8	46	45.0		x	x			80	8,360	388.6	706	82	23				80
54	Bucuresti	Dâmbovița / Arges		8			2,500.0	x						189,200	53330	70686	10872	2218				3,500
	Sum						4,209.7						949	515,654	80473.6	96097.67	16021	3437				5,150

Place of municipal hot spots from high priority list

Tabel 2.2.1.2.

Place	DISCHARGER NAME OF ECONOMIC UNIT	Transboundary transfer of polution
1	Braila	yes
2	Galati	yes
3	Zalau	yes
4	Craiova	yes
5	Resita	yes
6	Campulung Muscel	
7	Deva	
8	Timisoara	yes
9	Bucuresti	yes
10	Iasi	yes

Hot spots - MUNICIPAL
MEDIUM PRIORITY

Tabel 2.2.2.1.

Ser. No	Discharger/ Location	Receiver River/ Cachement area	PREVIOUS LISTS OF HOT SPOTS				Raw water load (TPE)	Curent treatment					Curent capacity of WWTP (TPE)	Waste water volume discharged Tm³/y	TOTAL LOAD DISCHARGED INTO RECIVING WATERS T/year							FINAL CAPACITY (TPE)
			SAP 93	PNA PM 95	Tab 2.2	PNA PM 97		No	Mu	Bio	N	P			BOD	COD	N	P	PATHOGENS	Oil	OTHERS	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
18	Targoviste	Ialomita / Ialomita	34		36		70.0		x	x			100	13,000	158	191	131	29				140
23	Rm. Valcea	Olt / Olt	29		45		104.0		x	x			150	21,100	849	902	240	49.3				150
	Sum						174.0						250	34,100	1007	1093	371	78.3				290

Place of municipal hot spots from medium priority list

Tabel 2.2.2.2.

Place	DISCHARGER NAME OF ECONOMIC UNIT	Transboundary transfer of polution
1	Targoviste	
2	Rm. Valcea	

Hot Spots - AGRICULTURAL
MEDIUM PRIORITY

Tabel 2.3 2.1.

Sor. No	DISCHARGER NAME OF ECONOMIC UNIT	RECEIVER RIVER/ MAIN CACHEMENT AREA	PREVIOUS LISTS OF HOT SPOTS: SAP 93	PNA PM 95	Tab. 2 2	PNA PM 97	ECONOMIC SECTOR / NR.	Problems / ISSUES Type of problem	DISCHARGED POLLUANT LOADS t/year: COD	BOD	SSM	N	Fe	Mn	Cu	Pb	Zn	OTHERS
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
88	Agrocomsuin Bontida	Somes Mic/Somes-Tisa					agr.-10		637.6	352.0		620						
90	Comsuin Moftin	Crasna/Somes-Tisa					agr.-10		298.8	49.5		91						
99	Comsuin Beregsau	Bega Veche/ Bega-Timis					agr.-10		2,247.0	3,043.0	1,629	818						
116	Braigal Braila	Danube/Dunube					agr.-10		733.3	485.6	1,179	892	1.6					
25	Combil Gh. Doja	Ialomita / Ialomita					agr.-10		157.0	280.0	562	96						
29	Avicola Satu Mare	Sar / Somes					agr.-10		4.2	2.4	3.3	1						31,12,1997
	Sum								4086.9	4222.5	3384.6	2529.3	14.6	14	15	16	17	

Place of agricultural hot spots from high priority list

Tabel 2.3 2.2

Place	DISCHARGER NAME OF ECONOMIC UNIT	Transboundary transfer of polution
1	Comsuin Beregsau	yes
2	Combil Gh. Doja	
3	Comsuin Moftin	yes
4	Agrocomsuin Bontida	yes
5	Avicola Satu Mare	yes
6	Braigal Braila	yes

Hot Spots - INDUSTRIAL
HIGH PRIORITY

Tabel 2.4.1.1

Ser No	DISCHARGER NAME OF ECONOMIC UNIT	RECEIVER RIVER/ MAIN CACHEMENT AREA	PREVIOUS LISTS OF HOT SPOTS: SAP 93	PNA PM 95	Tab. 2.2	PNA PM 97	ECONOMIC SECTOR / NR	Problems / ISSUES Type of problem	DISCHARGED POLLUANT LOADS t/year: COD	BOD	SSM	N	Fe	Mn	Cu	Pb	Zn	OTHERS
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
7	Phoenix Baia Mare	Săsar / Somes-Tisa					mine-5		98.0		944		27.4		8.4	0.3		
13	Petrom Suplac de Barcau	Barcău / Cris					oil-11			138.7	153							oil extraction
16	Sometra Copsa Mica	Târnava Mare / Mures	12	1	12		nonfer.met.-2			2.6	367	4,467	7.1	0.8		33.0	12.2	2,9 t/a Cd, CN-
17	Azomures Tg Mures	Mureş / Mures	40		40		chim-2				920	1,641	4.8	0.5	1.3	0.0	0.5	UREA = 884 t/a, TDS = 11678 t/a
46	Doljchim Craiova	Jiu / Jiu					chim-2		591.6	464.0	3,809	992						
55	Arpechim Pitesti	Dâmbovnic / Arges	25	B57	27	90	petrochim-2		607.0	298.0	1,410	92	14.6		0.1		0.2	3,5 t/a P; 1t/a CN ; 0.9 t/a Phen
56	Petrobrazi Ploiesti	Prahova / Ialomita	26		28	89	petrochim-2		1,523.0	4,297.0	2,651							10.4 t/a Phenols
65	Letea Bacau	Bistriţa / Siret	2	40	2	82	pulp+paper-3			11,324.0	1,325	1,838						517 t/a P
70	Fibrex Savinesti	Bistriţa / Siret					chim-2		3,054.0	1,811.0	2,200	831						
71	Pergodur P.Neamt	Bistriţa / Siret	23	45	25		pulp+paper-3		1,572.0	156.0	381	18	5.2					1,3 t/a P
76	Sidex Galati	Siret / Siret	15		15		iron-6		2,983.0		2,903	1,078	15.1				12.7	114 t/a Phen;4,5 t/a P
77	Antibiotice Iasi	Bahlui / Prut	19	58	20	85	chim pharm -2		64.3	40.4	34	12						3.6 t/a P
79	Siderca Calarasi	Danube/Dunare	7		7	88	iron-6		21.2		337		6.4					8.1 t/a Phen. 0.4 t/a CN
87	Somes Dej	Someşul Mic / Somes-Tisa					chim-2		4,144.2	1,108.7		130						
93	Indagrara Arad	Mureş / Mures					food-1		1,308.0	1,880.0	2,850	400						
100	Oltchim Rm Valcea	Olt / Olt					chim-2		1,870.0	737.0	11,007	548						31,12,1997
119	Sinteza SA Oradea	Crişul Repede / Criş				92	chim-2						0.2			310	845	0.012 t/a CN ; 11 t/a Phen
120	Clujana SA Cluj Napoca	Someşul Mic / Someş-Tisa				93	lether-9											
121	Colorom Codlea	Vulcăniţa / Olt	10	25	10	84	chim-2		544	141	74	9	11.7		0.3			31,12,1997 0.28 Phen
122	SC Favior Blănuri Orăştie	Mureş				94	lether-9											dfish. in WWTP Orăştie
125	Celohart Donaris Brăila	Danube/Dunare				83	pulp+paper-3			691								
128	UPS Govora	Olt / Olt					chim-2				2642	175						31/12/1997
129	Manpel Tg Mureş	Sewage / Mureş					leather-9		189.2		157.7							4.1CN; 4.3 t/a Cr3+; 41.8 t oil deterg 14.6
	Sum								18,569.5	23,149.4	34,863.0	12,230.6	92.5	1.3	10.1	343.3	870.5	

Place of Industrial hot spots from high priority list

Tabel 2.4.1.2.

Place	DISCHARGER NAME OF ECONOMIC UNIT	Transboundary transfer of polution
1	Letea Bacau	
2	Celohart Donaris Brăila	yes
3	Colorom Codlea	
4	Antibiotice Iasi	yes
5	UPS Govora	
6	Siderca Calarasi	yes
7	Petrobrazi Ploiesti	
7	Phoenix Baia Mare	yes
8	Arpechim Pitesti	
9	Manpel Tg Mureş	
10	Sinteza SA Oradea	yes
11	Clujana SA Cluj Napoca	yes
12	SC Favior Blănuri Orăştie	
14	Sometra Copsa Mica	
15	Petrom Suplac de Barcau	yes
16	Doljchim Craiova	yes
17	Sidex Galati	yes
18	Oltchim Rm. Valcea	
19	Indagrara Arad	yes
20	Somes Dej	yes
21	Fibrex Savinesti	
22	Pergodur P.Neamt	
23	Azomures Tg Mures	

Hot Spots - INDUSTRIAL
MEDIUM PRIORITY

Tabel 2.4.2.1.

Ser. No	DISCHARGER NAME OF ECONOMIC UNIT	RECEIVER RIVER/ MAIN CACHEMENT AREA	PREVIOUS LISTS OF HOT SPOTS: SAP 93	PNA PM 95	Tab. 2.2	PNA PM 97	ECONOMIC SECTOR / NR.	Problems / ISSUES Type of problem	DISCHARGED POLLUANT LOADS t/year: COD	BOD	SSM	N	Fe	Mn	Cu	Pb	Zn	OTHERS
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
12	E.M. Borod	Borod / Crişul Repede					mine-5			2.4	18		0.1					
22	Siderurgica Hunedoara	Cerna / Mures					iron-6				1,877	74	36.5					
23	E.M. Coranda Certej	Certej / Mures					mine-5		1.3		269		2.8	7.5	0.1	0.1	2.8	13,8 t/a Mg
24	E.M. Rosia Montana	Abrud / Mures					mine-5				273		26.0	16.7	0.1		0.8	14,2 t/a Mg
26	Ind. Sarmei Campia Turzii	Arieş / Mures					iron-6				408		35.4		8.4	0.0	3.8	0,2 t/a Cr
47	Nitramonia Fagaras	Olt / Olt	14		14		fertil-4		674.0	225.0	424	1,253	0.5					31/12/1997
48	Romacril Rasnov	Ghimbăşel / Olt					chim-2		73.0	26.0	42	9						31/12/1997
50	Celohart Zarnesti	Bistra / Olt	42	4	43		chim-2		842.0	325.0	112	40						31/12/1997
54	Dacia Pitesti	Doamnei / Arges					iron-6		427.6	216.0	370	94	3.3		0.2	0.0	0.2	8,9 t/a P
57	Romfosfochim Valea Calugareasca	Teleajen / Ialomita	40		42		chim-2				1,366	11						3,2 t/a P; 6261 t/a TDS
60	Astra Romana Ploiesti	Dâmbu / Ialomita					petrochim-2			738.0	1,155							3,7 t/a Phen.
61	Petrotel Teleajen	Teleajen / Ialomita	33	33	35		petrochim-2			835.0	1,679							9,4 t/a Phen.
66	Chimcomplex Borzesti	Trotuş / Siret	4		4		petrochim-2		506.0		448	22						0,17 t/a Phen.
72	Sofert Bacau	Bistriţa / Siret		47			chim-2		139.0		241	380	11.3					
73	Carom Onesti	Trotuş / Siret			23		chim-2		5.1	132.0	516				1.1			2,8 t/a Phen.
80	Alum Tulcea	Danube/Dunare	36		38		nonfer.met.-7				4,227							215 t/a Mg;48,2 t/a Al
81	CICH Tr. Magurele	Danube/Dunare	39		41		fertilizer-4		81.0		3,180	990	4.2					39 t/a P; 83 t/a Mg
83	Romag Tr. Severin	Topolniţa / Dunare					chim-2		432.0	291.0	1,820	1						19 t/a P
89	Terapia Cluj	Someşul Mic / Somes-Tisa					chim.pharm.-2		1,858.3	475.0		284	0.6	0.1				Pharmaceutical Plant
91	Stratus Mob Blaj	Târnave / Mures					furniture-11		647.6	343.9	441	55						wood Industry
95	Nutrimur Iernut	Mureş / Mures					agr.-10		114.0	245.0		51						
102	Ulcom Slobozia	Ialomiţa /Ialomita					food-1		221.0	350.0	640	16						
103	Beta Tandarei	Ialomiţa /Ialomita					food-1		589.0	655.0	473	70						
110	Spirt Ghidiceni	Bârlad / Siret					food-1		941.2	805.0	885	202						
126	Verachim Giurgiu	Danube/Dunare	17		18		chim-2		108		147	3						323 t/a Cl-
130	Comcem SA Calarasi	Danube/Dunare					chim-2		45		290							
	Sum								7,552.1	5,664.3	20,862.1	3,553	120.6	24.3	9.9			

Place of industrial hot spots from medium priority list

Tabel 2.4.2.2.

Place	DISCHARGER NAME OF ECONOMIC UNIT	Transboundary transfer of polution
1	Terapia Cluj	yes
2	Alum Tulcea	yes
3	Romag Tr. Severin	yes
4	Verachim Giurgiu	yes
5	Comcem SA Calarasi	yes
6	CICH Tr. Magurele	yes
7	Celohart Zarnesti	
8	Astra Romana Ploiesti	
9	E.M. Rosia Montana	
10	E.M. Coranda Certej	
11	Romacril Rasnov	
12	Petrotel Teleajen	
13	Romfosfochim Valea Calugareasca	
14	Siderurgica Hunedoara	
15	Spirt Ghidiceni	
16	Ind. Sarmei Campia Turzii	
17	Stratus Mob Blaj	
18	Sofert Bacau	
19	Ulcom Slobozia	
20	Nutrimur Iernut	
21	Chimcomplex Borzesti	
22	Beta Tandareni	
23	Dacia Pitesti	
24	Nitramonia Fagaras	
25	Carom Onesti	
26	E.M. Borod	

Cost estimation of projects (high priority)

Nr.	Name and Type of Project	Priority Number	Cost (million dollars)
0	1	2	3
PROJECTS FOR MUNCIPAL HOT SPOTS			
1.	Harmonization of EU regulations of emissions in water with the national standards (Non structural)	A I.3 - 1 (2)	0.025
2.	Support for monitoring reference laboratories (Non structural)	A I.3 - 13 (2)	0.928
3.	WWTP - Craiova Modernization (Structural)	A I.4 - 5	3.2
4.	Environment territorial laboratories development (Non structural)	A I.3 - 11 (2)	0.353
5.	Quality objectives in the activity of waer quality (Non structural)	A I.1 (2)	0.284
6.	Control and fight against accidental pollution (Non structural)	A I.3 - 23 (7)	0.1
7.	Introduction of new instruments for quality water protection (Non structural)	A I.3 - 15 (6)	0.2625
8.	Expansion of WWTP from Managalia city (Structural)	A I.4 - 1	5.44
9.	WWTP of Braila Nord (Structural)	A I.4 - 2	21.9
10.	WWTP of Galati city (Structural)	A I.4 - 3	29.5*
11.	WWTP of Zalau city (Structural)	A I.4 - 4	7.0*
12.	Development of WWTP of Resita city (Structural)	A I.4 - 6	3.5*
13.	Development of WWTP of Cympulung Muscel city (Structural)	A I.4 - 7	1.5*

0	1	2	3
14.	Development of WWTP of Deva city (Structural)	A I.4 - 8	5.6
15.	Guidelines on designing and operation of urban waste land fill (Non structural)	A I.3 - 2 (2)	0.125
TOTAL:			79.7175
	PROJECTS FOR AGRICULTURAL HOT SPOTS		
16.	Technologies of reclamation of agricultural soils affected by oil and salty water pollution (Non structural)	A I.5 - 4 (3)	0.75
17.	Ecological reconstruction of agricultural soils - Baia Mare (Structural)	A I.5 - 5 (5)	1.00
18.	Afforestation in the Copsa Mica area (Structural)	A I.5 - 13 (5)	3.142
19.	Agricultural turning to good account of zootechnical waste at at ROMSUIN TEST PERIS (Structural)	B II.1 - 7 (-)	1.297
20.	Capacity increase of WWTP of COMTOM TOMESTI (Structural)	B II.1 - 1	10
21.	Recycling and management of available waste from breeding farms (Structural)	A I.5 - 10 (-)	2.46
22.	Ecological reconstruction of poor agricultural land (Non structural)	A I.5 - 1 (1)	2.74
23.	Monitoring system development of chemical soil pollution in agricultural area (Non structural)	A I.3 - 16 (1)	0.676
24.	Biodiversity recovery of agricultural ecosystems affected by draught (Non structural)	A I.5 - 14 (6)	2.928
25.	Ecological reconstruction at Zlatna (Structural)	A I.5 - 15 (5)	2.458
26.	Protected areas monitoring (Structural)	A I.3 - 17 (2)	0.679
27.	Development of existing forests monitoring ecosystems (Non structural)	A I.3 - 21 (2)	0.317

0	1	2	3
28.	Fight against soil erosion in Tazlau river basin (Structural)	A I.5 - 11 (5)	3.428
29.	Rapid data collection by satelits applied on dangerous hydrometeo phenomena (Non structural)	A I.3 - Priority not yet established (2)	0.13
30.	Development of hydrological data base using GIS (Non structural)	A I.3 - Priority not yet established (2)	0.29
31.	Development of rapid dissemination of information about flood propagation (Non structural)	A I.3 - Priority not yet established (7)	0.212
32.	Dams rehabilitation along side Danube River from Iron Gate km 875 to Isaccea, km 103 (Structural)	A I.5 - 3 (6)	2.850
33.	Consolidation and rehabilitation of sliding lands in Zalau city (Structural)	A I.5 - 16 (5)	3.2
34.	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA VALEA CALUGAREASCA (Structural)	A I.5 - Priority not yet established (3)	2.8
TOTAL:			41.357
PROJECT FOR INDUSTRIAL HOT SPOTS			
35.	SELF MONITORING OF BIG INDUSTRIES (Non structural)	Pollution prevention	1.118
36.	Modernizing of installations from SC LETEA BACAU SA (Structural)	B II.1 - 2 (5)	1.5
37.	WWTP at SC CELOHART DONARIS Braila (Structural)	B II.1 - 3 (6)	2.7
38.	Waste water treatment at SC COLOROM CODLEA SA (Structural)	B II.1 - 4 (6)	25.3
39.	WWTP expansion at SC ANTIBIOTICE SA IASI (Structural)	B II.1 - 5 (6)	1.8
40.	Works for pollution reduction at UPS GOVORA SA (Structural)	B II.1 - 6 (5)	13.6
41.	Modernizing the secondary treatment of WWTP SC SIDERCA CALARASI SA (Structural)	B II.1 - 8 (6)	2.5

0	1	2	3
42.	Modernizing WWTP for oil products and sludge recovery at PETROBRAZI PLOIESTI (Structural)	B II.1 - 9 (5, 6)	2.8
43.	WWTP at ARPECHIM SA PITESTI (Structural)	B II.1 - 10 (6)	13.9*
44.	Ecologizing the wet process on the platform TIRGU MURES MANPEL SA (Structural)	B II.1 - 11 (5, 6)	1.1
45.	Removal chromium and zinc from the waste water discharged from fabrication of inorganic dyes and phenols from the synthesis of pharmaceutical products at SC SINTEZA ORADEA (Structural)	B II.1 - 12 (6)	0.33
46.	Modernizing WWTP CLUJANA SA CLUJ-NAPOCA (Structural)	B II.1 - 13 (6)	3
47.	WWPT system at VIDRA SA ORASTIE (Structural)	B II.1 - 14 (3)	1.2
48.	Action Program for environment protection in petroleum industry (Structural)	B II.1 - 15 (3)	100
49.	Harmonization of national legislation with six EU regulations regarding risks and industrial pollution control (Non structural)	A I.1 (2)	0.027
50.	Pollution with petroleum products abatement in PLOIESTI zone (pilot project) (Structural)	A I.5 - 12 (5)	5
TOTAL:			175.875
TOTAL GENERAL:			296.9495

* *Provisional estimation*

8. Development of national Pollution Reduction Program and Investment Portfolio

Cost Estimation of Projects (High Priority)

NR.	Name and Type of project	Priority Number	Cost (million dollars)
0	1	2	3
	PROJECTS FOR MUNICIPAL HOT SPOTS		
1.	**Harmonization of EU regulations of emissions in water with the national standards (non-structural)**	AI.3 - 1 (2)	0.025
2.	**Support for monitoring reference laboratories (non-structural)**	AI.3 - 13 (2)	0.928
3.	**WWTP - Craiova Modernization (Structural)**	AI.4 - 5	32
4.	**Environment territorial laboratories development (non-structural)**	AI.3 - 11 (2)	0.353
5.	**Quality objectives in the activity of water quality (non-structural)**	AI.1 (2)	0.284
6.	**Control and fight against accidental pollution (non-structural)**	AI.3 - 23 (7)	0.1
7.	**Introduction of new instruments for quality water protection (non-structural)**	AI.3 - 15 (6)	0.2625
8.	**Expansion of WWTP from Mangalia city (Structural)**	AI.4 - 1	5.44
9.	**WWTP of Braila Nord (Structural)**	AI.4 - 2	21.9
10.	**WWTP of Galati city (Structural)**	AI.4 - 3	29.5*
11.	**WWTP of Zalau city (Structural)**	AI.4 - 4	7.0*
12.	**Development of WWTP of Resita city (Structural)**	AI.4 - 6	3.5*
13.	**Development of WWTP of Campulung Muscel city (Structural)**	AI.4 - 7	1.5*
14.	**Development of WWTP of Deva city (Structural)**	AI.4 - 8	5.6
15.	**Guidelines on designing and operation of urban waste land fill (non-structural)**	AI.3 - 2 (2)	0.125
TOTAL			79.7175

(continued from previously page)

0	1	2	3
	PROJECTS FOR MUNICIPAL HOT SPOTS		
16.	Technologies of reclamation's of agricultural soils affected by oil and salty water pollution (non-structural)	AI.5 - 4(3)	0.75
17.	Ecological reconstruction of agricultural soils - Baia Mare (Structural)	AI.5 - 5(5)	1.00
18.	Afforestation in the Copsa Mica area (Structural)	AI.5 - 13(5)	3.142
19.	Agricultural turning to good account of zootechnical waste at ROMSUIT TEST PERIS (Structural)	BII.1 - 7(-)	1.297
20.	Capacity increase of WWTP of COMTOM TOMESTI (Structural)	BII.1 - 1	10
21.	Recycling and management of available waste from breeding farms (Structural)	AI.5 - 10(-)	2.46
22.	Ecological reconstruction of poor agricultural land (Non-structural)	AI.5 - 1(1)	2.74
TOTAL			21.389