DANUBE POLLUTION REDUCTION PROGRAMME

NATIONAL PLANNING WORKSHOP ROMANIA

Constanta, September 30 - October 3, 1998

MINISTRY OF WATERS, FOREST AND ENVIRONMENTAL PROTECTION

in cooperation with the

Programme Coordination Unit
UNDP/GEF Assistance

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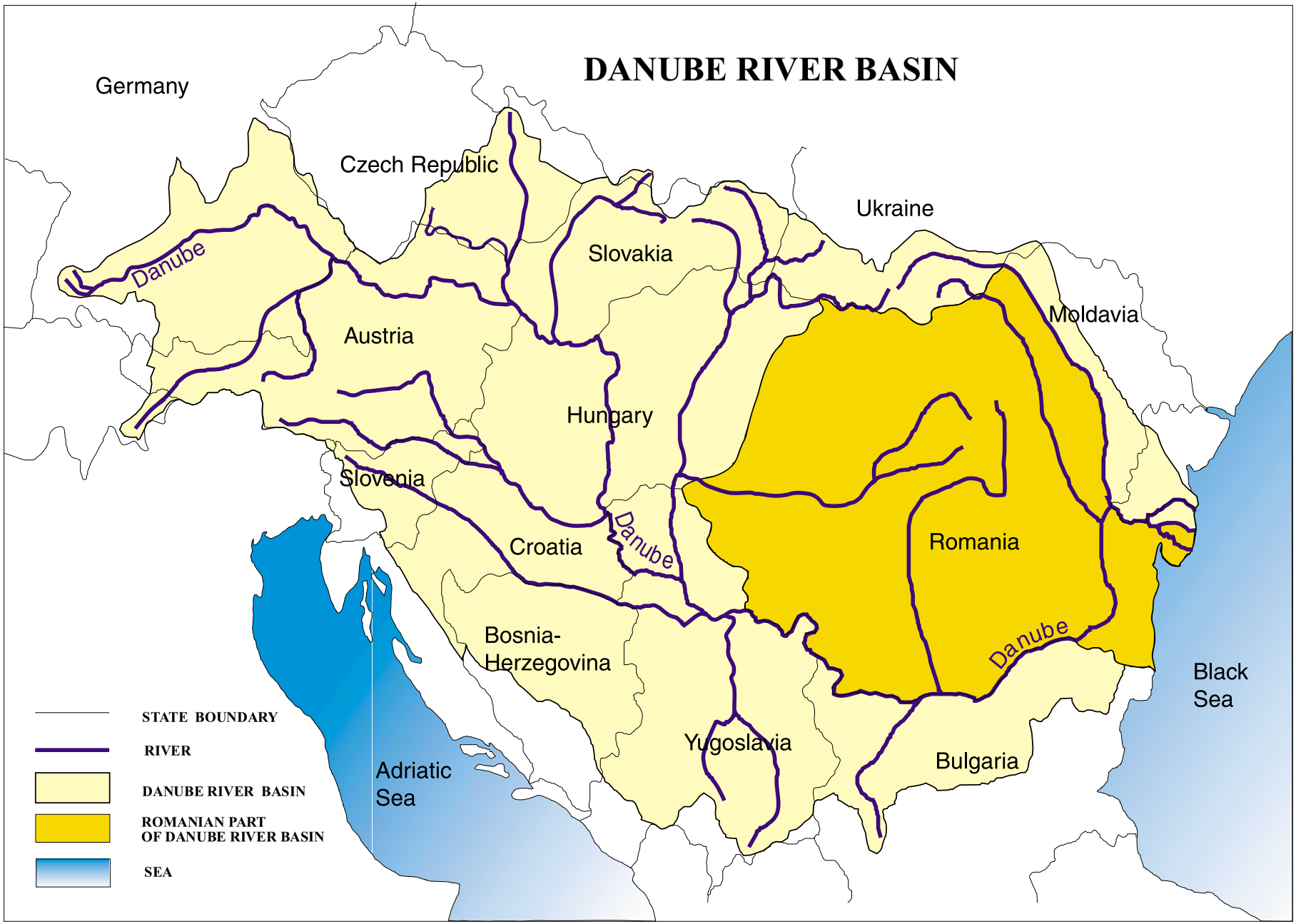
Preface

The present report is based on the results of the National Planning Workshop, held in Constanta, Romania from 30 September to 3 October 1998. The main goal of the workshop and its report is to provide a comprehensive presentation of analysis concerning problems and solutions for reduction, as well as control of water pollution and its effects. The result is a national contribution to the development of the Danube Pollution Reduction Programme and a revision of the Strategic Action Plan (SAP) of the ICPDR.

The workshop was prepared under supervision of the Ministry of Waters, Forest and Environmental Protection, by the Romanian Waters Authority and Country Project Coordinator Mr. Octavian Ceachir with help of facilitators – Mrs. Adriana Mircea, Mrs. Cerasela Stancu and interpreters – Mrs. Camelia Serbanescu and Mrs. Christina Sofron. Organizational and technical support have been given by Mrs. Camelia Dumitrache and Mr. Emanoel Stoicescu – secretaries and others - Mrs. Cerasela Maiorean, Mrs. Elena Teican and Mr. Florian Ancuta. A team of national experts, who elaborated National Review Reports, was present to guide the participants in scientific and technical matters.

The present report was prepared by the national experts Mr. Matei Codreanu (agriculture and land management), Mrs. Mihaela Popovici (industry and transport), Mr. Mihail Lesnic (municipal waste management) with the assistance of the national facilitators. It is based on ideas, expert opinions and results of discussions from the workshop.

A team of international experts from UNDP/GEF, Maxime Belot and Marcela Fabianova gave assistance, support and guidance in the methodological approach and report writing. Overall conceptual guidance and technical advice was given by Joachim Bendow, UNDP/GEF Project Manager, to reinforce national initiatives.


DANUBE RIVER BASIN
Germany
Czech Republic
Ukraine
Slovakia
Danube
Austria
Moldavia
Hungary
Slovenia
Danube
Croatia
Romania
Danube
Bosnia-
Herzegovina
Black
Sea
Yugoslavia
Bulgaria
Adriatic
Sea
STATE BOUNDARY
RIVER
DANUBE RIVER BASIN
ROMANIAN PART
OF DANUBE RIVER BASIN
SEA

... the workshop has been held in the famous "Casino" in Constanta...

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Abbreviations

WWTP	=	Waste Water Treatment Plant
BAT	=	Best Available Technique
BOD	=	Biological Oxygen Demand
NTPA	=	Technical Norms for Water Protection
SAP	=	Strategic Action Plan (1993)
NEAP	=	National Environment Action Program
p.e.	=	Population Equivalent
EU	=	European Union
NGO	=	Non Governmental Organization
EPA	=	Environment Protection Agency
RS	=	Romanian Standard

Executive Summary

In the frame of the Environmental Danube Programme of the ICPDR and with the assistance of UNDP/GEF, a team of Romanian experts has elaborated National Reviews, providing information on water quality, analyzing financing mechanisms, describing social and economic framework conditions and developing projects and programs for pollution reduction, improvement of water quality, sustainable management of aquatic ecosystems and protection of resources. These elements, as well as the results of the National Planning Workshop shall constitute a national contribution to the development of the Danube Pollution Reduction Programme and shall provide elements for the revision of the Strategic Action Plan (SAP) of the ICPDR.

This present report shows the results of the National Planning Workshop, which took place in Constanta, Romania, from 30 September to 3 October 1998. It is one of 11 national workshops, which have been organized in all participating countries, signatories of the Danube River Protection Convention or adhering to its principles.

The total area of Romania is 237,500 km^2, out of which 98% is included in the Danube River Basin.

The human activity in the country during the last 30 years had major influences upon the environmental factors. The agricultural, industrial and municipal development, which was not accompanied by appropriate environment protection measures, resulted in a continuous degradation of environmental factors, with effects upon the general state of human health as well.

Particular causes and effects of pollution from point and diffuse sources, as well as transboundary water pollution have been analyzed in a sector approach, considering agricultural activities, industrial activities and the municipal sector. Based on the sector analysis, it has been identified as core problem that ***"human activities with negative effects upon the environment".*** Direct causes of the core problem were described as "inadequate use of water and soil resources in agriculture", from the agriculture and land use sector, "significant pollution from industry" from the industry and transport sector and "inefficient management of the waste waters and solid waste" from the municipal waste management sector.

A specific feature for Romania is that it is generating problems for upstream (Hungary) and for other riparian countries as well (Ukraine, Republic of Moldavia, Yugoslavia and Bulgaria), but, on the other hand, it is suffering the consequences of Danube water pollution by all the other upstream countries.

The existence of the Danube Delta as last filtering element before the discharge in the Black Sea is creating supplementary negative problems for the ecosystems existing in the Delta, but with positive effects for the Black Sea.

Thus, the water quality analysis in the inland rivers (in Romania and in the other riparian countries as well), in the Danube, in the Danube Delta and in the Black Sea, belong to the same trophic chain.

Considering the result of the problem analysis, the program objective was defined as ***"pollution reduction in the Romanian catchment of the Danube river"***, which will contribute to the overall goal of the UNDP/GEF Danube Pollution Reduction Programme: ***"Achievement Sustainable development in the DRB"***.

In order to identify sector strategies, each of the priority sectors were thoroughly examined:

In the sector **Agriculture and Land Use,** the sector objective is to perform appropriate use of water and soil resources. In order to achieve this objective, it is necessary to:

- *introduce appropriate agricultural practices;*
- *achieve appropriate management of the animal waste from animal farms;*
- *perform efficient management of the forests;*
- *implement ecological farming practices and appropriate management of the hydro-technical works.*

In the sector **Industrial Waste Management,** in order to achieve pollution prevention and abatement for industry, it is required to:

- *implement clean technologies;*
- *ensure discharge of standard quality treated waste water**s**;*
- *adopt proper management of solid waste management;*
- *perform adequately wastes transport.*

In the sector **Municipal Waste Management,** to achieve the sector objective, it is necessary to:

- *adopt adequate management of waste water;*
- *perform pre-treatment of basic and specific waters;*
- *implement proper management of solid waste.*

The results of the workshop demonstrated that projects to implement the strategies for pollution reduction in the DRB are clearly needed. **Priority projects** have been identified as the following:

In the **Agriculture and Land Use sector**:

- Afforestation of Copsa Mica area
- Control soil erosion in Tazlau River Basin

In the **Industrial Waste Management sector**:

- Modernization of Celohart Donaris Braila waste water treatment plant
- Sealing of phosphorus-gypsum pond Fertilchem Navodari
- Purification of soil and groundwater in Ploiesti

In the **Municipality and Waste Management sector**:

- Development of environmental labs in transboundary areas: Timisoara, Resita, Craiova, Calarasi, Galati, Tulcea, Bacau, Iasi, Suceava, Satu Mare, Oradea, Arad
- Equipment for treatment plant of UPSOM Ocna Mures.

1. Introduction

1.1. Background

The present Report was prepared and is including the results of the Workshop held in September 30 - October 3, 1998 in Constanta, on the subject pollution reduction in the Danube River Basin, organized by the Romanian Ministry of Waters, Forests and Environmental Protection, with the assistance of UNDP / GEF.

Romania is a Danube riparian country, covering an area of 237,500 km^2, out of which 98% belongs to the Danube catchment; that is 28.9% of the whole basin (805,300 km^2). Due to its geographical position, Romania is affected by the quality of water polluted already by the up-stream countries, influencing also the water quality of the river, as a result of the economic activities performed on the territory of the country.

The Danube Pollution Reduction Programme started by the end of 1997 and is carried out simultaneously in 11 riparian countries. The main goal is to prepare documents presenting the existing situation at national level, as well as proposals for improving the situation in short, medium and long term.

For improving the quality of the environmental factors in the Danube River Basin, in 1992 started the Environmental Programme for the Danube River Basin, having as main objective to create the necessary infrastructure for applying the Convention on the cooperation for the protection and long sustainable use of the Danube. This Convention was ratified by most riparian countries and will come into force during this year. Romania was among the first countries to ratify the Sofia Convention, in 1995. Nine countries, thus creating the conditions for coming into force during this year (1998) ratified up to now, the Convention. All the results obtained both in the Pollution Reduction Programme and Danube Environmental Programme are meant to support the activity within the Convention.

The Romanian Government, as initiator of the water management activities in the Danube hydrographic basin, by in Bucharest Declaration that was initiated in 1985 (regarding the cooperation of the Danube states in matters connected with the Danube waters management and especially with the river protection against pollution), is constantly supporting both the Sofia Danube Convention and the Pollution Reduction Programme. Romania is considering the Danube problems to be closely linked to their effect upon the Danube Delta, as well as upon the Black Sea; all these elements are seen as included in the same trophic chain, in which the upstream changes have direct implication upon the downstream links.

The Workshop was attended by representatives of different activity sectors, such as ministries, universities, research and engineering institutes, representatives of the civil society, agencies for environmental protection, branches of the "Romanian Waters" National Water Authorities.

1.2. Methodological Approach

The organization of the National Planning Workshop in Romania is part of the planning process to develop the Danube Pollution Reduction Programme in line with the policies of the Danube River Protection Convention. UNDP/GEF gives its technical and financial support to organize a country-driven planning process and to ensure involvement of all stakeholders at national, as well as regional level.

The first step of this process consisted of the elaboration of National Reviews, with particular attention to the collection of viable water quality data, the analysis of social and economic framework conditions, the definition of financing mechanisms and the identification of national priority projects for pollution reduction. For this purpose, a team of national experts for water quality data, water engineering, socio-economic analysis and financing mechanisms has been established within the Ministry of Environment,

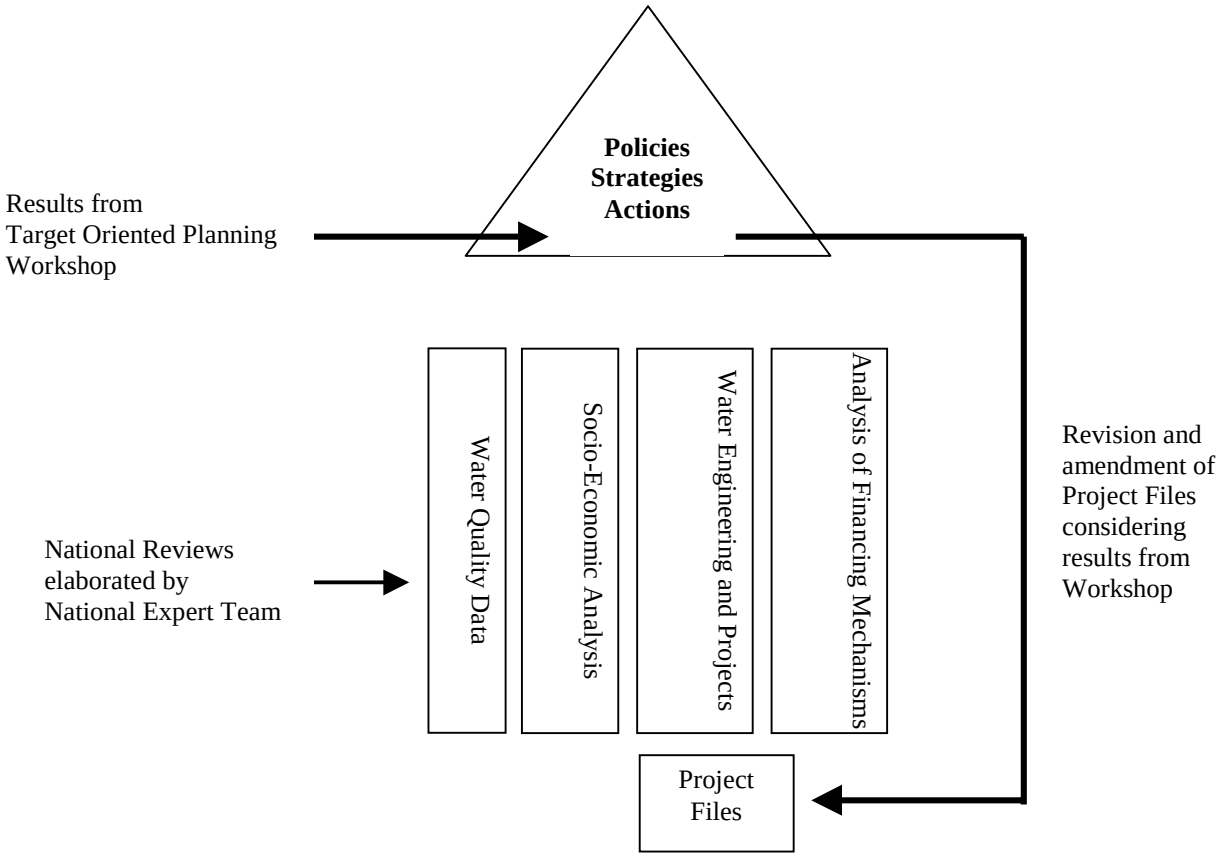
and under the guidance of the Country Programme Coordinator. The results of these studies represent the baseline information for participants of the National Planning Workshop. Moreover, they constitute the national contribution, in technical, economic and financial terms, for the elaboration of the Danube Pollution Reduction Programme with particular attention to transboundary issues and the development of an investment portfolio.

To ensure wider participation in the planning process, prior initiatives have been taken to organize an NGO-Consultation Meeting, which took place in Mangalia, in June 1998. On this occasion, the Non-Governmental Organizations have discussed common strategies and priority measures for pollution reduction and designated their participants for the National Planning Workshop, as well as for the forthcoming regional meeting of the Danube Environmental Forum (regional NGO with the participation of all Danube countries).

Within the frame of the National Planning Workshop a multi-disciplinary team, including participants from various ministerial departments, from municipalities and regional organizations, from universities and scientific institutions and from the civil society (NGOs) has analyzed the causes and effects of water pollution and developed strategies and actions for pollution reduction and improved management of aquatic ecosystems and resources.

The workshop has been organized in using target oriented planning methodology (TOPP) and applying logical framework approach. The results constitute a comprehensive and integrated presentation of policies, strategies and actions in three main sectors: Soil Management (Agriculture), Industry and Municipality. The achievements of the workshop will contribute to national planning, with particular attention to the development of sector-related strategies and actions for pollution reduction and protection of aquatic ecosystems and resources. At the regional level, the results of the workshop will help to define transboundary issues and to develop regional strategies and actions for the revision of Strategic Action Plan of the ICPDR. Identified projects will be taken into account in the elaboration of the Danube Pollution Reduction Programme and in particular in the Investment Portfolio.

The following chart designs the functional links of the planning process at the national level:



The main characteristics of the methodological approach for the conduct of the workshop include:

- **Target oriented planning methodology,** which allows defining problems and objectives in a logical frame while taking constraints and limits into consideration. It promotes a systematic, step-by-step approach based on well-focused, task-oriented discussions. This facilitates the description of expected results and actions, the finding of innovative solutions, the definition of assumptions and of impact indicators to support, at later stage, monitoring of programme implementation;
- **Team approach**, which draws on the knowledge, ideas, experience, and judgments of the participants. The collective effort of decision-makers, planners, implementing agents, and beneficiaries is likely to lead to better results than unilateral decision making. The method builds on group interaction aimed at consensus building; it promotes communication and collaboration between participants in all stages of analysis;
- **Visualization of results** in form of colored cards, which are integrated into formal structures, presenting the various aspects of group discussion so that each stage of the analysis is clearly visible to all participants. Cards also serve as the basis for the documentation of the deliberations and the preparation of the final report;
- **Elaboration of Workshop Report,** presenting in written form the results of the workshop and strictly the charts and planning tables elaborated in consensus by the participants and taking into account the arguments and reasons developed during the discussions.

The Target Oriented Programme Planning (TOPP) methodology includes the following stages:

- Definition of River Basin Areas
- Situation/Stakeholders Analysis (with identification of assets, resources and favorable conditions)
- Problem Analysis (causes and effects of pollution)
- Analysis of Objectives (measures to reduce and control pollution)
- Definition of Actions and Important Elements (detailed description of actions to facilitate report writing)
- Identification of Existing, Ongoing and Proposed Projects (in relation to identified actions)
- Definition of Assumptions and of Impact Indicators (to monitor programme and project implementation)

2. General Frame of Analysis

2.1. Identification and Description of River Basin Areas Considering Physical, Demographic and Economic Situations

The total area of Romania is 237,500 km^2, out of which 98% is included in the Danube River Basin; the remaining 2% are represented by direct discharges of a few small rivers in Dobrogea directly in the Black Sea.

The whole Romanian territory is divided into 15 first degree basins or basin groups; in order to make the analysis in the present report possible, these 15 basins and basin groups were included into three large hydrographic areas, corresponding somehow to the three Romanian historical regions:

a. Hydrographic area 1 – Transilvania
b. Hydrographic area 2 – Muntenia
c. Hydrographic area 3 – Moldova

(i) Hydrographic Area 1 (Transilvania)

Physical-Geographical Characteristics

The Hydrographic Area 1 (Transilvania) is including 2 basins (Tisa, Nera) and 4 basin groups (Somes-Crasna, Crisuri, Mures-Aranca-Ier, Bega-Timis-Caras).

The area of the Hydrographic Area 1 is representing 34.71% (82,440 km^2) of the country; the rivers length is 30,254 km (38.34% of the total length); the hydrographic density is 0.36 km/km^2 (higher than the country average which is 0.33 km/km^2); the water volume is 4903 million m^3, and the surface waters is amounting 592.14 km^2.

The relief is various, from mountains, tablelands, hills, and decreasing to very low flat plains (such as Somes, Ier, Crisuri and Timis Plains).

The climate is varying according to the altitude and relief, but generally is tempered, with oceanic influences (in Transilvania tableland) and sub-mediterranean (in Timis and Nera sub-basins - in the southwestern part of Romania). Rainfalls are high in the Apuseni Mountains (over 1000 mm), and only between 500-700 mm in the tablelands and plains.

Afforestation is higher in the river sub-basins springing from or crossing mountain areas (such as Somes, Crisuri, Mures, Nera).

The **Tisa** River springs in the Forest Carpathians (in Ukraine). A very short part (only 61 km of the river length) is the boundary line between Romania and Ukraine in the north; the general direction is E-W; the river is flowing into the Danube after crossing Hungary and Yugoslavia. The total catchment area (in Romania) is 4540 km^2 (1.9% of the country area); the river network density is 0.35 km/km^2, with an average annual discharge of 125 m^3/s (at the point where it leaves the Romanian territory). The forest area is 1709 km^2, meaning 37.6% of the river catchment area, and 2.7% of the total forest area in the country.

The **Somes** River is an important tributary for Tisa (on the Hungarian territory), and one of the largest river in Romania (as average annual discharge - 121 m^3/s); and as length - 376 km). It springs from the Eastern Carpathians; its general direction is NE-NW, it crosses hilly areas, then Baia-Mare Hollow-land (an important mining area - non-ferrous minerals, such as lead, zinc etc.), and it flows in Hungary after flowing through the low Somes Plain. The river network density is

0.35 km/km^2; the total catchment area is 15,740 km^2 (6.6% of the country), out of which 29.8% is taken by forests (4688 km^2, meaning 7.4% of the country forest area). It is flowing through 2 large cities (Baia-Mare and Satu Mare - over 125,000 inhabitants, Baia-Mare being the largest processing center for non-ferrous minerals and having an important chemical industry, producing sulfuric acid).

The next major basin is **Crisuri**. In fact, there are three almost parallel rivers, which are flowing out of Romania; on the Hungarian territory, they are merging successively in two, and then in one river, which is flowing into Tisa. The largest is Crisul Alb, 234 km in length. It springs from the Apuseni Mountains, it flows in the western part of the country, when it leaves the mountains, it flows in the very low Crisuri Plain, with quite good quality soils, after drainage and construction of channels; its general direction is E-W; the catchment area is 13,443 km2 (6.3% of the country), out of which 25.3% (3759 km2) is taken by the forest (5.9% of the country forest area). The river network density is 0.39 km/km2, higher than the country average, but the average annual discharge is not very high (21.7 m3/s). The rivers are crossing mining areas, as well as a very large city (Oradea - over 200,000 inhabitants), with important industrial activities (aluminum processing).

The fourth basin is Mures-Aranca-Ier. The most important river is Mures, the longest river in Romania (except the Danube; 761 km only on the Romanian territory), and third as average annual discharge (157 m3/s). It springs from the Eastern Carpathians, the middle stream is crossing the Transilvanian Tableland and after crossing the mountains (between Apuseni and Southern Carpathians), flows through the plains in Tisa in Hungary. The river network density is 0.39 km/ km2. Its catchment area is 27,890 km2 (11.7% of the country) - the second largest in the country (after Siret basin), out of which 32.8% is taken by forests (9147 km2, meaning 14.4% of the total forest area in the country). The river is crossing important agricultural areas and 4 large cities (Targu Mures, Arad - over 150,000 inhabitants, and Alba Iulia, Deva - over 60,000 inhabitants), with important industrial activities; it is collecting industrially polluted waters from its tributaries (pulp and paper industry - Petresti, fertilizers industry - Targu Mures and Arad, pesticides industry - Tarnaveni etc.).

Timis is springing from the Southern Carpathians and has a 244 km length on the Romanian territory. Its general direction is first S-N, then E-W in the low Timis Plain (area with important embankments and drainage works); downstream N-S in Yugoslavia and it flows directly into the Danube downstream Belgrade. Its catchment area is 7310 km2 (3.1% of the country), out of which 27.5% (2009 km2) is taken by forests (3.2% of the country forest area). Its river network density is 0.33 km/km2, same as the country average; the average annual discharge is 40.4 m3/s.

Nera is quite a small river; its length is 143 km, all of it on the Romanian territory, it has even the lowest average annual discharge in the Hydrographic Area 1 (14 m3/s), but the highest river network density (0.42 km/km2 as compared to 0.33 - the country average). It springs from the Southern Carpathians, it is located in the south-western part of Romania, and its general direction is E-W; it is crossing the mountains and then a small plain, until flowing directly into the Danube (this is the reason for which it is seen as first degree basin). Its catchment area is 1380 km2 (out of which more than half - 55.1% / 761 km2 is taken by forests - that is 1.2% of the country forest area).

Socio-Demographic Characteristics

The population living in the Hydrographic Area 1 is about 6,65 million persons, 52.7% in urban areas (less than the country average) and 47.3% in rural areas. Density is varying widely from 42.5 (Caras-Severin county, general low density + large mountain area) to 108.9 inhabitants/km2 (Cluj county, high concentration in Cluj city).

The need for water of the population is 509.6 million m3, for industry 1485.5 million m3, and for agriculture 21 million m3; the latter being about 18.8% of the need for the Hydrographic Area 3 and only 1.5% of the need for the Hydrographic Area 2. A possible explanation is that rainfalls are higher in this area and the share of agricultural land in the total area is lower.

Discharges of wasted water are: from population - 429.7 million m3 and from industry - 1155.8 million m3.

Transboundary Effects as Perceived

Transboundary effects are issuing both from hot spots and diffuse sources. Hot spots are easier to identify and locate, therefore is easier to monitor them. *Main industrial hot spots (high priority)* with important transboundary effects included in the Hydrographic Area 1 are: Phoenix Baia Mare (mining activities), Somes Dej (chemical factories), Clujana Cluj-Napoca (leather processing) - in Somes basin, Sinteza Oradea (chemical factories) and Petrom Suplacu de Barcau (oil extraction) - in Crisuri basin, Indagrara Arad (food processing) - Mures basin.

To the above mentioned, we should add *medium priority agricultural hot spots* (there are no agricultural hot spots considered to have transboundary effects in Hydrographic Area 1). It is obvious that all are located in animal husbandry complexes, mainly for pigs, such as: Moftin, Bontida and Satu Mare - in Somes basin, Beregsau - in Timis basin.

Municipalities are contributing as well to the transboundary effects of pollution; the towns Zalau - in Somes-Crasna basin, Resita and Timisoara - in Bega-Timis basin should be mentioned as high priority municipal hot spots.

Human and Economic Activities

In the description of each first-degree basin, only a few important towns (as source of municipal pollution) and human activities resulting in very important water pollution have been mentioned. In the table below, all these activities are classified and listed, from the entire first-degree basins, not only on the main river.

Table 1: Major sources of water pollution in the Hydrographic Area 1

No.	First degree hydrographic basin	Type of industry/activity (location)
1.	Tisa	- mining
2.	Somes	- non-ferrous metallurgy (Baia Mare) - chemical (Cluj, Dej) - animal husbandry (pigs, poultry)
3.	Crisuri	- oil fields - mining - cement (Alesd)
4.	Mures	- chemical (Copsa Mica, Turda, Targu Mures, Ocna Mures, Arad) - non-ferrous metallurgy (Copsa Mica, Zlatna) - iron and steel (Calan, Hunedoara) - mining - animal husbandry (pigs) - food (sugar - Targu Mures) - machine building (Cugir) - cement (Campia Turzii)
5.	Bega-Timis	- iron and steel (Resita) - animal husbandry

(ii) Hydrographic Area 2 (Muntenia)

Physical-Geographical Characteristics

The Hydrographic Area 2 (Muntenia) is including 6 inland river basins (Cerna, Jiu, Olt, Vedea, Arges, Ialomita), the Danube basin (not including the first degree basins, but including the Danube Delta), as well as the Black Sea shore basin.

The area of the Hydrographic Area 2 is 101,190 km2, representing 42.6% of the total area of the country. The rivers length is 28,943 km (36.68% of the total length), the hydrographic density is 0.28 km/km2 (lower than the country average - 0.36), the water volume is 10,284 million m3, and the surface waters are amounting 3284.64 km2.

The relief is various, descending from very high mountains (the Southern Carpathians are the highest in Romania), to high hills (sub-carpathians), tablelands, high plains and low plains, descending from N to S, to the Danube River and Black Sea. In this hydrographic area is located the largest plain, the Romanian Plain, which has the most fertile soils in the country (highest humus content), mainly in the south-eastern area (Black Sea shore basin, Danube basin, Ialomita basin, as well as the southern part of the other basins (Jiu, Olt, Vedea and Arges). This high fertility is accompanied by a temperate - continental dry climate, with the lowest average rainfalls in the country (less than 500 mm yearly). The very frequent droughts led to the construction of important irrigation systems. Unfortunately, large parts of these irrigation systems were destroyed after 1990, or cannot be used because of high operational and maintenance costs, combined with scattered ownership regime which is creating difficulties in cost recovery.

The afforestation degree is high in the long river basins (Olt), or rivers springing from high mountains (Jiu, Arges).

Cerna is a small river (the smallest in terms of length - 79 km only) considered as first degree basin. Its catchment area is 1360 km2 (0.6% of the country area), out of which 55.6% (756 km2) is taken by forests - that is 1.2% of the country total forest area. Its general direction is N-S, and is crossing the mountains, flowing also through a ferrous mining area. Its average annual discharge is 23 m3/s.

The **Jiu River** is one of the important rivers flowing on Romanian territory. Its length is 339 km and its springs are located in the Southern Carpathians. It has a river network density 0.38 km/km2, and an average annual discharge is 92 m3/s. Its catchment area is located in the southern part of Romania, covering 10,080 km2 (4.2% of the country area), out of which 37.5% (3777 km2 - 6.0% of the country forest area) is taken by forests. It is crossing the most important and oldest coal mining area in the country (Petrosani basin). It flows then to the south through high hills, and after receiving its most important tributary (Motru - which is crossing the second important coal mining area in Romania - Motru basin), and is crossing the western part of the Romanian Plain. The middle part of its catchment area is covering an important oil-drilling area too. There are two important cities on the river: Targu Jiu (over 80,000 inhabitants) and Craiova (over 260,000 inhabitants), with intense industrial activity. An important polluter is the fertilizer factory in Isalnita.

Olt is the third longest inland river in Romania (after Mures and Prut), 615 km, having the second highest river network density (0.41km/km2, as compared to the country average - 0.33). Its catchment area is also the second largest (24,050 km2, that is 10.1% of the country area); it is located in the central and southern part of Romania (its general direction is E-W, than N-S). Its upper stream is crossing the Ciuc and Brasov hollow-lands, the middle stream is crossing the southern part of the Transilvanian Tableland, the Fagaras hollow-land and southern high hills, and the lower stream is flowing through Getic Tableland and the Romanian Plain. The forests are taking 34.9% of the catchment area (8404 km2), and 13.3% of the country forest area. It is the

second largest inland river in the country - 165 m3/s average annual discharge (after Siret River). There are three towns on the Olt river (62,000 - 87,000 inhabitants): Sfantu Gheorghe, Ramnicu-Valcea and Slatina. In these cities, as well as in smaller towns, there are important polluting industrial activities (coal mining, oil fields, chemical factories in Ramnicu Valcea (fertilizers, pesticides, chloro-sodic products) and Turnu Magurele (fertilizers and sulfuric acid), aluminum processing in Slatina etc.

The catchment of the **Vedea river** is located in the central southern part of the country only and is covering 5430 km2 (2.3% of the country area), with a river network density slightly higher than the country average (0.37km/km2). It is springing in the sub-Carpathian area, and its length is 224 km, with a quite low average annual discharge (13 m3/s). The forests are taking a low share of the catchment area (8.85% - 478 km2), and even lower in the country forest area (0.8%). It is flowing through high hills and plains and finally through low plains (Romanian Plain). There are no major cities on the river (two towns with 33,000 - 48,000 inhabitants), but important oil and natural gas fields.

Arges is an important river flowing in the southern part of the country, its general direction is NW-SE; its length is 350 km, and its average annual discharge (65 m3/s). Its catchment is quite large, covering 12,550 km2 (5.3% of the country area), with a river network density of 0.36 km/ km2. The forests are covering 3283 km2 (26.2% of the catchment area and 5.2% of the country forest area). The river spring is in the Southern Carpathians (Fagaras Mountains, the highest in Romania). It is crossing the southern part of the Fagaras Mountains, the Arges Platform, the high and then the low plains. There are 2 towns with 28,000 inhabitants (Curtea de Arges and Oltenita) and the city of Pitesti, with 150,000 inhabitants. The Arges River is receiving a very important tributary: Dambovita, the river, which is flowing through Bucharest (capital of Romania). The main polluting activities are oil fields in the middle stream, as well as an important refinery in Pitesti.

Last, but not least, the **Ialomita River** is completing the Hydrographic Area 2 (Muntenia); it is quite a long river (417 km), not a large one (41 m3/s average annual discharge). Its catchment is 10,350 km2 (4.4% of the country area), with a river network density of 0.30 km/ km2, lower than the country average, taking into account also that it is flowing through one of the driest areas in the country. Its spring is in the Southern Carpathians (Bucegi Mountains). It crosses the high hills (the general direction is NW-SE), and then it enters the high plains, changes its general direction to W-E and flows through the low plains, with good quality soils in Baragan Plain, but creating also sandy soils along the riverbed. The area taken by the forests in the catchment area is 22.9% - 2365 km2 (3.8% of the country forest area). The larger town on the river is Targoviste (82,000 inhabitants), with important steel industry, it is crossing also (in the upper to middle stream) important areas for coal mining and oil fields. In the town of Slobozia there is an important fertilizers factory.

The Danube River Basin. The Danube is the largest river in Central and Eastern Europe; in terms of length and catchment area it is the second largest river in Europe, after Volga. The total catchment area is 805,300 km2 and is collecting tributaries from 8 different states. The river is resulting from the junction of Brege and Brigach rivers, having their springs on the eastern side of the Black Forest Mountains in Germany, and at the opposite end is flowing into the Black Sea through the three branches in the Danube Delta - Chilia, Sulina and Sfantul Gheorghe. The total length of the river, from the junction of the two springs rivers to the mouth is 2850 km, out of which 2588 km are navigable (from Ulm to Sulina), and 1075 km are on the Romanian territory. In the mouth area, the Danube is splitting into branches, thus resulting a delta (75 km in length - E-W direction, and 65 km in width - N-S direction.

The Romanian sector is divided into five sectors having special morphological and hydrological features:

1. **Carpathian narrow passes.** It has 144 km, from Bazias (point where the Danube is entering the Romanian territory) to Gura Vaii; it is receiving the direct contribution of two hydrographic basins of first degree (Nera and Cerna). From Bazias onwards, the Danube is representing the border with Yugoslavia.
2. **South-pontic sector.** The longest sector has 566 km in length (between Gura Vaii and Bratul Borcea Lowland. Four major rivers are flowing into the Danube here, creating four important hydrographic first-degree basins: Jiu, Olt, Vedea, Arges. Most of its length is representing the border with Bulgaria.
3. **Eastern-pontic with swamps sector.** It is including the Ialomita Swamp and Braila Swamp. It has 195 km in length. This sector is crossing the Romanian territory, separating Dobrogea and Muntenia. Only one major river is flowing into the Danube in this sector, resulting in a hydrographic first degree basin (Ialomita),
4. The **northern part of Dobrogea** is the next sector. It is including the part of the Danube from Braila to the entrance in the Delta (Ceatal Chilia - upstream Tulcea town (80 km). Water is coming from two major hydrographic first-degree basins: Siret and Prut.
5. **The Danube Delta sector.** Out of its total area (5,500 km^2), 80% is on the Romanian territory.

The Danube is indirectly collecting waters from 32% of the country area. It is from Hungary and Yugoslavia, by means of Tisa River, in the northern part of Romania; directly from 66% of the country area and only on 2% of the country area the rivers are tributaries directly to the Black Sea, in the southeastern part of Romania. In the Danube catchment area the Razim and Sinoe lakes were included too.

The river network density is extremely low (0.14 km/km2, as compared to the country average (0.33 km/km2). The Romanian catchment area is 33,250 km2 (14% of the country area); (the hydrographic first-degree basins were not included). At the entrance in the Delta (Ceatal-Ismail), the average annual discharge is 7300 m3/s. The forests are taking a very small share - 3316 km 2, meaning 10% of the catchment area and 5.2% of the total forest country area.

It was mentioned that only on 2% of the country area the rivers are tributaries directly to the Black Sea or its lakes, in the southeastern part of Romania. Together they form the Black Sea shore hydrographic basin. There are 64 small rivers, located exclusively in Dobrogea, summing a total length of 918 km; the river network density is half of the country average (0.17 km/km2).

The total catchment area is 5480 km 2 (2.3% of the country area). The main city is Constanta (over 350,000 inhabitants), the largest Romanian harbor at the Black Sea, there are also two smaller towns, Tulcea (80,000 inhabitants) and Medgidia (almost 50,000 inhabitants). There are also several small towns on the Danube - Black Sea Channel. All of these produce serious pollution: oil refinery, fertilizers and sulfuric acid in Midia-Navodari, cement (Medgidia), aluminum and other non-ferrous metals processing in Tulcea, nuclear plant in Cernavoda, and so on.

A very special sector of the Danube River in the Romanian sector is the Danube Delta. Due to its very peculiar features, it deserves a special attention. The Romanian Government itself, taking into account all the arguments, decided in 1990 to declare the Danube Delta as Biosphere Reserve. This decision was confirmed by the Romanian Parliament through Law 82/1993. The Man and Biosphere Programme of UNESCO recognized the universal value of the reserve in 1990 through its inclusion in the network of biosphere reserves.

The Danube Delta Biosphere has a total area of some 5,800 km2 and is located between 28º10'E, 28º42'W, 45º27'N and 44º20'S. The junction between the Dobrogean hills and the wetlands of the river system marks the terrestrial limit of the reserve. The 45th parallel that marks the mid-way line between the North Pole and the Equator actually runs through the reserve.

The Danube Delta can be divided into a number of discrete geographic units based on their morphological and biological characteristics. These are: the Delta itself (including the three main river branches of the Chilia, Sulina and Sfantu Gheorghe channels), the Razim-Sinoie lagoon complex, the Black Sea coast out to 20 m depth, the undivided River Danube east to Cotul Pisicii, the Isaccea-Tulcea floodplain, and the Murighiol-Plopul saline plains.

The Deltaic zone. The Delta of Danube is the largest component of the reserve, with a total area of about 4,178 km2, of which 3,446 km2 (82%) lies in Romania, and the remainder (732 km2) in Ukraine, mostly comprising a secondary delta at the mouth of the Chilia branch.

The Razim-Sinoie lagoon complex is located to the south of the delta, and has a total area of some 1,015 km2 of which the limans (flooded areas) and lagoons comprise 863 km2. The complex consists mainly of basins that were originally marine bays, but which over the last 1,500 years became isolated from the sea by sand bars and dunes resulting from the deposition and eastward drift of sediments from the mouth of Danube, and the seaward advance of the delta itself over the past 3000 years.

The Danube River is an element of the delta, running from the Danube bifurcation (Chatal Izmail) at Patlageanca west to Cotul Pisicii, a distance of about 55 km. The river channel runs between the Dobrogean and Moldavian hills, and its bed is often well below sea level (exceeding 30 m). The width of the channel is 1,000 m at Isaccea, and is slope is 5-6 mm/km. This stretch of the river forms a link between the former inland delta (the now largely drained river island of Braila) and the coastal delta proper.

The Isaccea-Tulcea floodplain, located upstream from Tulcea, is bounded by the Tulcea branch, the main river and the Dobrogean hills. It is formed like an elongated a basin, with its edges higher that the interior, and covers about 92 km2. This area is the last flood zone before the delta itself and during the spring floods all the lakes and swamps are flooded. The levees are about 2-3 m above sea level and are largely vegetated with trees and shrubs. Plaurs (disaggregated mats of reeds) cover an area of about 26 km2, most of which float. The open water areas are formed mainly by 16 lakes, ranging in size from 10 hectares to 230 hectares, and linked by channels and smaller ponds.

The Saraturii-Murighiol zone is an area which holds Lake Saraturi and is located on a Danubian terrace between Murighiol and Plopul. The lake is 2 km long and has a maximum with of 500 m. Its water is very saline, with a high concentration of chlorides and sulfates, and supports a wide variety of phyto-and zooplankton.

Socio-Demographic Characteristics

The Hydrographic Area 2 (Muntenia) amounts the highest number of population (11.6 million persons, 59.5% living in urban areas and only 40.5% in rural areas). Here can be found areas with high population density, corresponding to the counties with intense industrial development degree, such as: Prahova (185.4), Dambovita (138.6), Brasov (119.9) and Constanta counties (105.9 inhabitants/km2) and Bucharest, of course.

The need for water of the population is 1151.2 million m3, for industry 4230 million m3, and for agriculture 1371 million m3.

Discharges of wasted water is: from population - 750.5 million m3 and from industry - 3532.1 million m3 (three times more than in Hydrographic Area 1 and 11 times more than in the Hydrographic Area 3).

Transboundary Effects as Perceived

In the Hydrographic Area 2, all rivers are flowing directly or indirectly into the Danube; therefore only the Danube transmits transboundary effects. These effects have to be considered as having two directions: on one hand, pollution effects produced in the Romanian catchment area of the Danube, which are transmitted to the neighboring countries (Yugoslavia, Bulgaria, Ukraine and Republic of Moldova. But on the other hand we have to remember that Romania is the last downstream country before the Danube if flowing into the Black Sea; therefore it is a receiver for all transboundary pollution effects produced in all the countries located in the rest of the upstream catchment area (only one example - an important nuclear power plant - Koslodui - is located on the Bulgarian side of Danube).

In terms of producing and transmitting transboundary pollution effects, worthwhile mentioning are the industrial hot spots Doljchim Craiova (Jiu basin), Celohart Donaris Braila (pulp and paper) and Siderca Calarasi - the largest metallurgic plant in Romania - (last two located in Danube basin).

Nor in the Hydrographic Area 2 there are not first priority agricultural hot spots, but only a medium priority one, Braigal Braila, the largest agricultural holding in the country, located in the Great Braila Island (Danube basin).

Important municipal hot spots from the high priority list are located in the Hydrographic Area 2: Craiova (Jiu basin), Bucharest (Arges basin) and Braila (Danube basin).

Human and Economic Activities

The Hydrographic Area 2 is the most important, taking into account the number of population, the share of urban population, as well as the economic activities in the basin. Bucharest, the capital of the country is the largest city in Romania (it has about six times more population than the second largest city), and a various number of economic activities are developed here, with large industrial units, employing an important number of people. Together with the capital, several large cities (350,000 - 150,000 inhabitants) are included in the basin (Constanta, Brasov, Craiova, Ploiesti, Braila, Sibiu, Pitesti).

Table 2: Major sources of water pollution in the Hydrographic Area 2

No.	First degree hydrographic basin	Type of industry/activity (location)
1.	Jiu	- coal mining - coke preparation plants (Lupeni) - electric power (Paroseni, Rovinari, Turceni)
2.	Olt	- chemical (fertilizers, pesticides, plastic, pulp, chloro-sodic products, paints) (Fagaras, Rasnov, Ramnicu Valcea, Zarnesti, Govora, Codlea, Feldioara) - oil fields - non-ferrous metallurgy (aluminum) (Slatina) - animal husbandry (pigs - Izbiceni) - used waters treatment plants (Brasov, Sibiu, Ramnicu Valcea)
3.	Vedea	- animal husbandry (pigs - Zimnicea)
4.	Arges	- chemical (Pitesti) - oil fields - animal husbandry (pigs - Calarasi; poultry - Crevedia) - lead batteries (for cars, lorries, buses etc.) (Bucharest) - non-ferrous metallurgy (Bucharest) - nuclear technologies (Pitesti) - car factories (Pitesti, Campulung Muscel) - textile (Balotesti); - cities used water treatment plant (Pitesti, Bucharest)

No.	First degree hydrographic basin	Type of industry/activity (location)
5.	Ialomita	- petrochemical (Ploiesti, Brazi) - chemical (Ploiesti, Brazi, Valea Calugareasca, Slobozia, Floresti) - oil fields - animal husbandry (pigs) - iron and steel (Targoviste) - food (sugar - Tandarei)
6.	Danube	- chemical (Turnu Severin, Turnu Magurele, Giurgiu, Braila) - iron and steel (Calarasi, Tulcea) - non-ferrous metallurgy (aluminum) (Tulcea)
7.	Black Sea shore	- refinery (Midia, Navodari) - chemical (fertilizers)(N`vodari) - oil - extraction marine platforms (Constanta)

(iii) Hydrographic Area 3 (Moldova)

Physical-Geographical Characteristics

The Hydrographic Area 3 (Moldova) is including only two basins: Siret and Prut.

The area of the Hydrographic Area 3 is 53,880 km2 (22,7% of the country area), the rivers length is not very important as compared to the other two Hydrographic Areas (1907 km - 25% of the total river length). The hydrographic density is equal to the country average - 0.36 km/km2, the volume of water 4020 million m3, and the surface waters are amounting 744.76 km2.

The relief is various, descending from mountains, to high hills and tablelands, and then decreasing from NW to SE to the very low Siret plain. In the Prut river basin (the eastern part of the country) soils are again of very good quality, with high humus content. Except the high hills and mountains, the largest part of this Hydrographic Area has low rainfalls, varying from 450 to 600 mm yearly (so a temperate-continental dry climate). Irrigation systems, sometimes combined with drainage systems can be found also here, pumping water from Siret river (in the central part), from Prut river (in its flooding plains) and from the Danube (in the southern part).

Siret is the largest inland river in the country, as catchment area - 42890 km2 (18.1% of the country area), as well as average annual discharge - 210 m3/s. The river network density is 0.35 km/km2. It springs from the Forest Carpathians (in Ukraine); its catchment area is located in the northeastern part of Romania. The upper stream is in Ukraine, on the Romanian territory there are only the middle stream (flowing through Suceava Tableland, and down stream of the river, flowing through the low Siret Plain (the lowest area in the country as altitude compared to the sea level). The forests are taking 37% of the catchment area and 25% of the country forest area. The largest city on the river is Galati, which is located - more precisely at the junction between Siret and Danube. It is a very large city (285,000 inhabitants), with important industrial activities, such as : metallurgic factories, as well as chemical, producing washing powder etc. Very important pollution influences are received through its tributaries, which are flowing through the most important and industrial activities in this part of the country (timber, wood processing, chemical (fertilizers, pesticides, sulfuric acid), pulp and paper etc.

The **Prut river** is springing in The Forest Carpathians in Ukraine, but there is also a second spring in the very northern part of Romania. The Prut River is on all its length in Romania (742 km), border with Ukraine and Republic of Moldova. The catchment area is located entirely in the eastern part of Romania, with a general direction N-S, on the right side of the river and is amounting 10,990 km2 (4.6% of the country area), with a river network density of 0.41 km/km2. It is flowing in hilly and high plains in Moldova. The average annual discharge is 80 m3/s. The forests are taking 9.9% of the catchment area, that is 1085 km2, and 1.7% of the country forest area.

Socio-Demographic Characteristics

The population living in the Hydrographic Area 3 is about 4.32 million persons. It is the only area where rural population is far more than the urban one (61.1% rural population as opposed to 38.9% urban). Density is higher than the Hydrographic Area 1, varying from 81.0 (Vrancea county), quite close to the country average (95.7) to 143.5 (Galati county) and 148.2 inhabitants/km2 (Iasi county), due to high concentration in Galati and Iasi cities). Anyway, the upper Siret valley is traditionally a rural area with high density of population; because the other areas in the country with such numbers are very developed from the industrial point of view.

The need for water of the population is 331.5 million m3 (lowest among the three analyzed hydrographic areas, due to presence of population mostly in rural areas), 480.2 million m3 needed for industry (about 11% of Hydrographic Area 2), and 111.8 million m3 for agriculture.

Discharges of wasted water are: from population – 337.4 million m3 and from industry - 318 million m3.

Transboundary Effects as Perceived

In the Hydrographic Area 3, transboundary effects are received by Romania coming from the upper streams of the two main rivers, Siret and Prut, but mainly on the Prut river, which is - all along its flow on the Romanian territory - border with Ukraine and Republic of Moldova. The transboundary effects transmitted to them are coming both from hot spots and diffuse sources. There are only few hot spots included in the high priority list as having transboundary effects in this hydrographic area: Antibiotice Iasi - an important industrial enterprise for chemical - pharmaceutical products, Comtom Tomesti - a huge animal pig farm, located directly in the Prut River basin, and Iasi city (over 300,000 inhabitants) as municipal hot spot.

Therefore, main water pollutants in this hydrographic area are: from metallurgic industry in the Republic of Moldova; from Romania wasted waters from municipalities and organic substances/nutrients (N, P) coming from diffuse agricultural sources, but mainly wasted water coming from animal farms.

Human and Economic Activities

Downstream the Siret and Prut River, the main economic activity is agriculture. Exception are here a few important cities, such as Iasi (over 305,000 inhabitants), Galati (285,000 inhabitants, Bacau and Buzau (over 125,000 inhabitants). Besides these cities with important industrial activities, mainly the tributaries of the two large rivers are submitted to pollution, due to activities such as: oil extraction and refineries; chemical plants, producing fertilizers, washing powders, pesticides, sulfuric acid, chloro-sodic products; pulp and paper mills; timber and wooden products etc.

Table 3: Major sources of water pollution in the Hydrographic Area 3

No.	Hydrographic basin	Type of industry/activity (location)
1.	Siret	- petrochemical (Borzesti, Darmanesti, Onesti) - chemical (pulp &paper, fertilizers, synthetic yam and fibre) (Letea, Piatra Neamt, Savinesti) - iron &steel (Galati, Buhusi, Buzau) - mining - animal husbandry (pigs) - other industries (felt, used waters treatment plants) (Buhusi, Buzau)
2.	Prut	- chemical (Iasi) - animal husbandry (pigs) - used waters treatment plant (Iasi)

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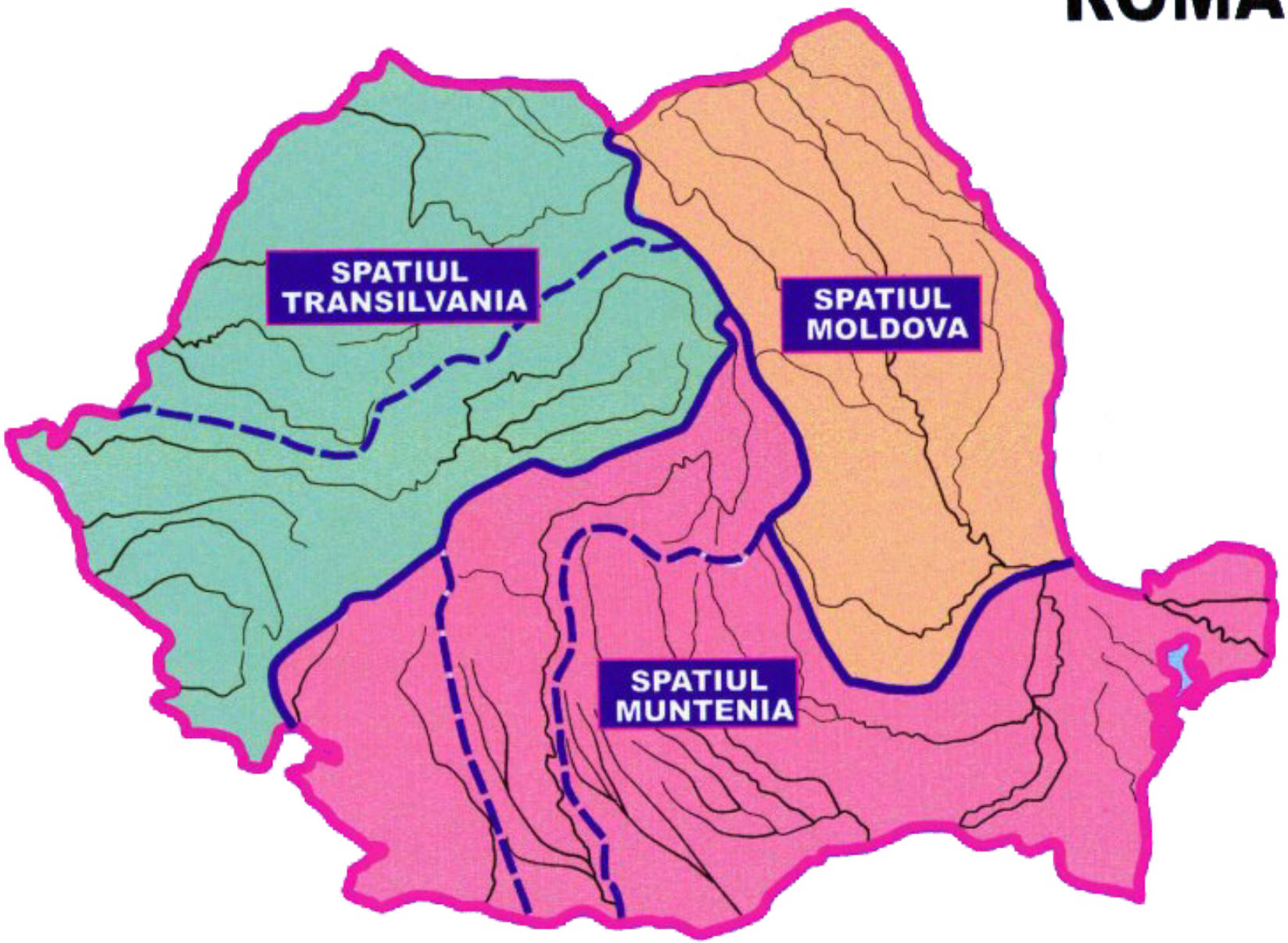


2.2. Problem Analysis

2.2.1. Core Problem

Following of the analysis results, the core problem has been identified as:

HUMAN ACTIVITIES WITH NEGATIVE EFFECTS UPON THE ENVIRONMENT

Water is one of the most important elements of the environment. Life without water or without proper quality of water cannot exist.

The water resources, both surface and groundwater, are directly affected by the human activities with negative effects generally upon the environment.

In very important to retain that the Danube River has a high contents of polluting factors originating from the upstream riparian countries. Due to the serious upstream pollution, especially with organic matters, nitrates and phosphates, the waters of the Danube River fall, at their entrance in Romania, into the II quality category. The polluting substances have a strong negative impact all along the Romanian sector.

The waters in Romania underwent a serious decay on certain sectors and in some areas, due to the pollution with noxious substances, resulting especially from industry, agriculture and municipalities. For instance, approximately 3,000 km of rivers is highly degraded, being almost lifeless and large areas of subterranean ground waters have also been polluted with nitrates.

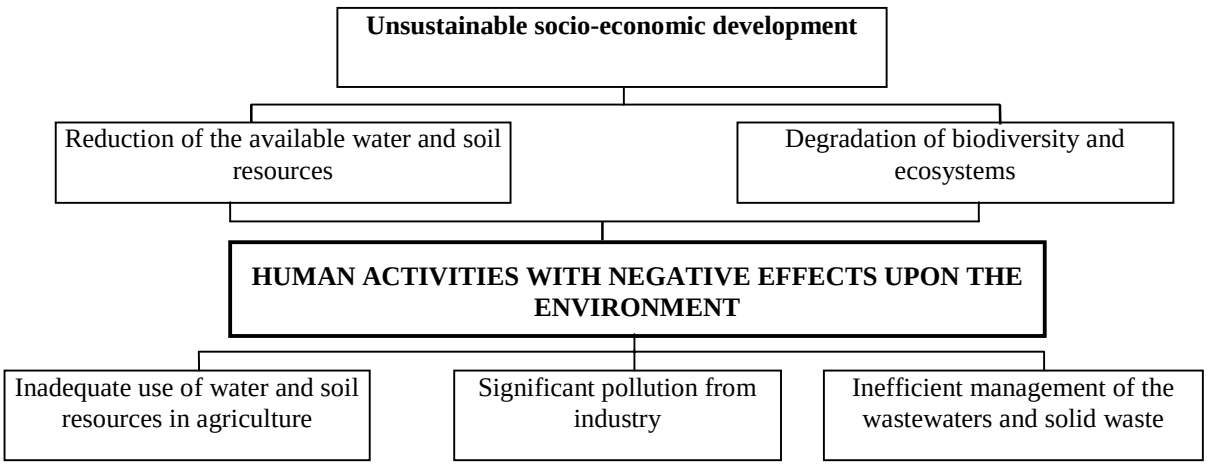
In this context is easy to understand the hard impact of the human activities on the watercourses and ground waters.

2.2.2. Direct Causes of the Core Problem

The following direct causes leading to the core problem were identified:

- **inadequate use of water and soil resources in agriculture,** due to use of inadequate agricultural practices, inappropriate management of animal waste from animal farms, improper forest management, inadequate agricultural activities and hydro-technical works upstream the Danube Delta ;
- **significant pollution from industry,** due to inadequate management of solid waste, inadequate transport of solid and liquid waste, discharge of wastewaters;
- **inefficient management of the wastewaters and solid waste,** due to insufficient water management, inefficient pre-treatment of toxic and specific waters, inadequate solid waste management.

Scheme of Problem



2.2.3. Effects of the core problem

These following direct consequences of the core problem have been identified:

- **Pollution of surface and groundwater**

  The surface and groundwater are affected by pollution with nitrates, heavy metals, organic matters, or are microbiologically contaminated due to the: use of inadequate agricultural practices, discharge of wastewaters coming from municipal sector, and inefficient pre-treatment of toxic and specific waters released from industry.

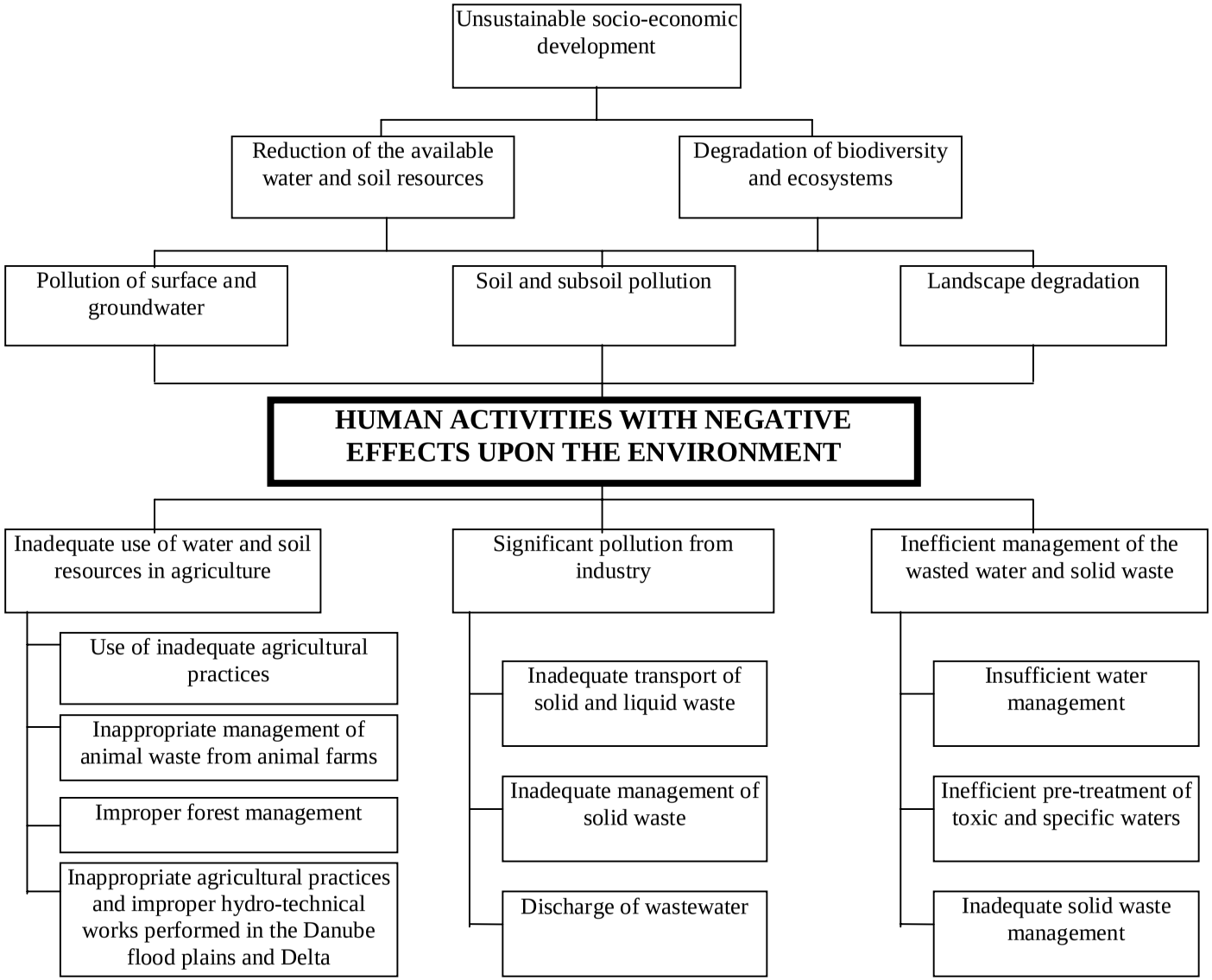
- **Soil and subsoil pollution**

  The pollution of the soil and subsoil is caused by the following activities: inappropriate management of animal waste from animal farms, inadequate transport of solid and liquid waste, produced as secondary matters in industrial sector and insufficient water management within the municipal sector;

- **Landscape degradation**

  The degradation of the landscape is one of the effects generated by the inadequate solid waste management. In the same time, the improper forest management leads also to the landscape degradation through erosion processes.

General Problem Analysis



2.3. Analysis of Objectives and Identification of Priority Sectors

2.3.1. Description of Objectives

The programme objective at the Romanian National Workshop was defined as:

"POLLUTION REDUCTION IN THE ROMANIAN CATCHEMENT OF THE DANUBE RIVER"

98 % from the Romanian territory belongs to the Danube River Basin. In comparison with the other European countries, Romania holds the 12th position, from the point of view of the water resources. Because of this, the available water resources depend both by the quantity as well as the quality of waters, both surface and groundwater.

The Romania's water resources are represented by inland rivers and lakes, ground waters and Danube River, which is the most important, especially for the southern part of the country. The Black Sea is not taken into account as an available water resource.

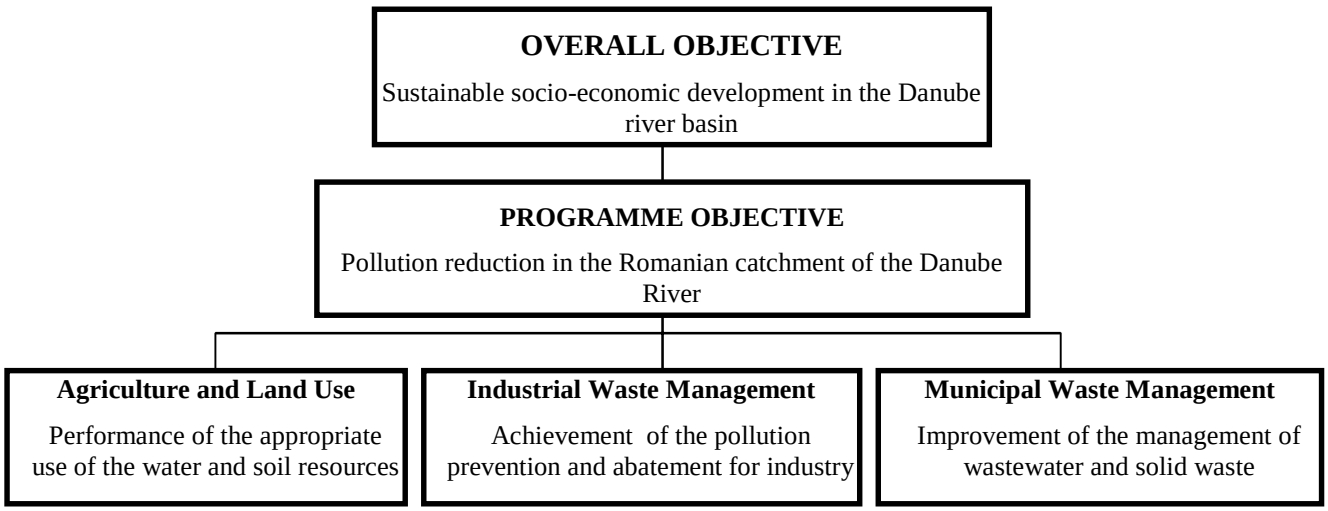
This program objective contributes to the overall objective of the UNDP/GEF Danube Pollution Reduction Programme, which was defined as follows:

"ACHIEVEMENT OF SUSTAINABLE DEVELOPMENT IN THE DANUBE RIVER BASIN"

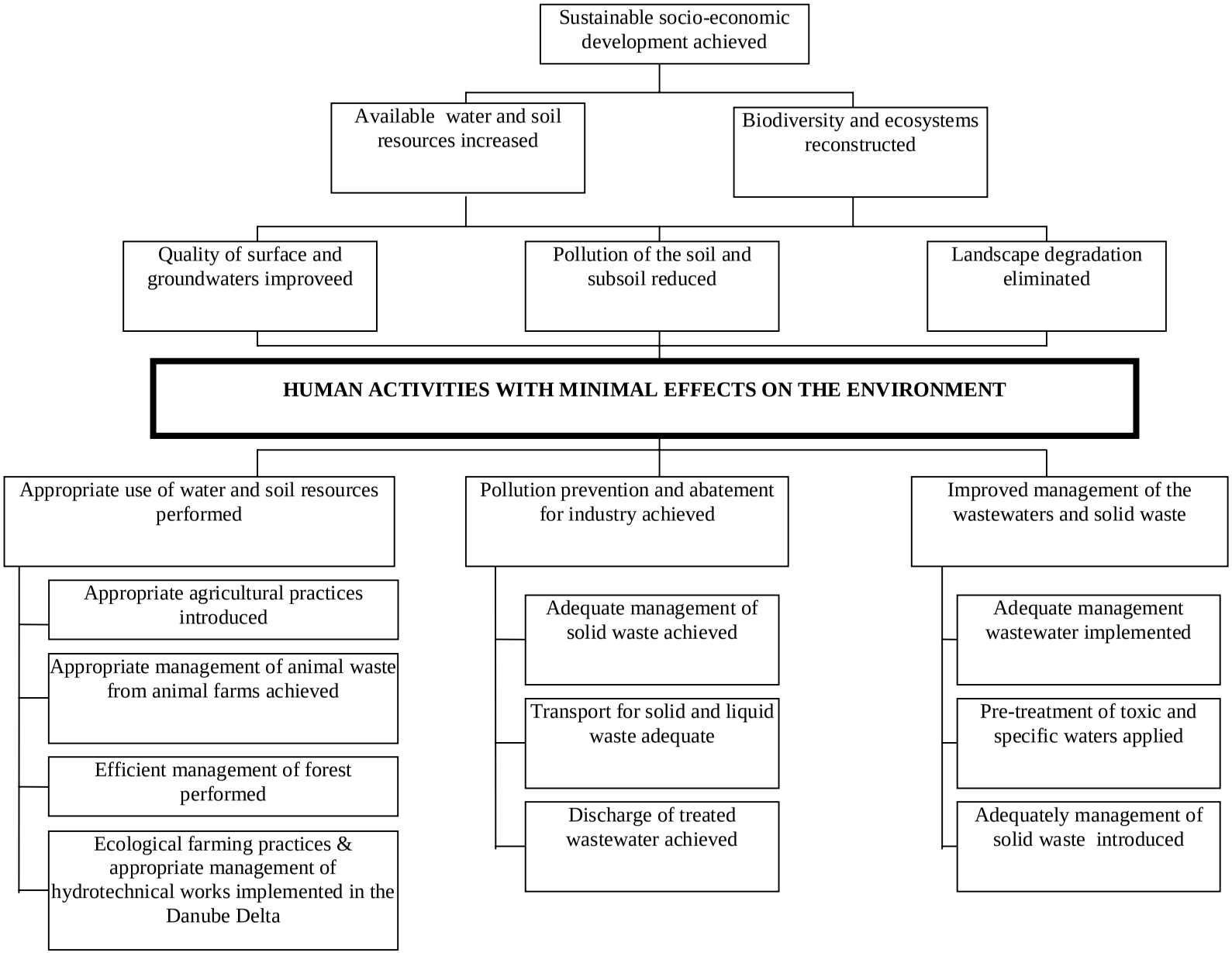
In order to ensure pollution reduction in the Romanian catchment of the Danube River, specific objectives have been identified for the following sectors:

- **Agriculture and Land Use:**
  Performance of the appropriate use of the water and soil resources.
- **Industrial Waste Management:**
  Achievement of the pollution prevention and abatement for industry.
- **Municipal Waste Management:**
  Improvement of the management of wastewater and solid waste.

Scheme of Objectives



Global Hierarchy of Objectives



2.3.2. Identification of Priority Sectors

The reduction of the pollution in the Romanian catchment of the Danube River is very important. A better quality of waters means more available water resources for drinking, agriculture and industry. It means also a better protection of the environment and the conservation of ecosystems.

In order to achieve the program objective, measures have to be undertaken in the following priority sectors:

(i) Agriculture and Land Use

Regarding the Agriculture and land use, the sector objective is to perform appropriate use of water and soil resources. In order to obtain this objective is necessary to:

- introduce appropriate agricultural practices
- achieve appropriate management of the animal waste from animal farms
- perform efficient management of the forests
- implement ecological farming practices and appropriate management of the hydro-technical works implemented

(ii) Industrial Waste Management

With respect to the industrial waste management, the sector's objective is to achieve pollution prevention and abatement for industry. For reaching this objective is necessary to:

- implement clean technologies
- ensure discharge of standard quality treated wastewaters
- adopt proper management of solid waste
- perform wastes transport adequately

(iii) Municipal Waste Management

Concerning the municipal waste management sector, the sector objective is to improve the management of wastewater & solid waste. To obtain this objective it is required to:

- adopt adequate management of wastewater
- perform pre-treatment of toxic and specific waters
- implement proper management of solid waste

2.3.3. Important Assumptions for Program and Sector Objectives

The objective identification was assisted by considering important assumptions. External factors, important for the success of the program, but are outside of its scope and not under direct control of the program. These external factors may influence the implementation and sustainability of the program from the long-term point of view.

The following *assumption for the program objective* has been identified:

- **Financial international cooperation is extended**

  Romania has tow very important features, in the framework of the Danube River Basin: on the hand is the largest country from Danube catchment, on the other hand is situated at the end of the lower part of the basin, making the connection with the Black Sea. Because of this, Romania is affected by and affects also the Danube water quality. If we are considering the

reasons presented above and in the same time cumulating them with the economical situation of Romania, we can understand way that the extension of the financial international cooperation in this field represents a very specific and important assumption. This assumption is necessary to be realized in order to ensure the success of the planned strategy.

The following important *assumptions for the sector objectives* are necessary in order to achieve the program objective:

For Sector ***Agriculture and Land Use***:

- **The economical conditions are favorable**

  In the present, the bad situation from the agricultural sector is owned to the:
  - negative economical evolution of this sector after 1989 - due to the transition;
  - changing of the ownership regime of the land which leaded also to economical perturbances.

  In this context is necessary to create and develop favorable economical condition at the society level, in order to solve, at list partially, the economical problems of this sector. In present the negative economical conditions have a strong influence on the way in which the water and soil resources are used in agriculture.
- **Financial resources are provided**

  At the present in Romania agriculture does not benefit by a satisfactory financial support. In order to improve the agricultural activities in profitable condition and to stimulate the adoption of the sustainable agricultural practices, is necessary to support this sector with more financial resources.

For the sector *Industrial Waste Management*:

- **Sustainable environmental economic policies at governmental level is supported and promoted**

  One of the most pollutant sectors is represented by the industry, due to the produced wastewater and solid waste. The Governmental economical policies are influencing the development of all industrial activities that produce waste. In Romania now is necessary to support and promote environmental economical policies, which can provide the sustainable development of industrial sector, having as result the improvement of the industrial waste management.

For the sector *Municipal Waste Management*:

- **Inter-regional political cooperation is developed**

  The political cooperation at the regional level it is a very important factor, when we are speaking about municipal waste management. Through this cooperation can be developed a series of common programmes at regional level concerning the management of municipal waste, can be realized exchanges of technologies or even common site for municipal waste with common management **procedures.**
- **Sustainable behavior of population achieved.**

  Sustainable behavior of population has been agreed to be an important assumption to achieve the sector objective because the efficiency of the waste management depends also by the way in which is made the first step of this process, which starts in the households, public or private institution etc. The process of the waste management can be made easier when the population have a sustainable behavior. Public awareness, educational programs, as well as public participation play an important role in the decision making process of all riparian countries. The ratification of Espoo Convention, regarding the impact of activities on the environment in the transboundary context is necessary.

2.3.4. Impact Indicators for Program and Sector Objectives

Impact Indicators were developed for the program and the sector objectives. They define the contents of the objectives in operationally measurable terms (quantity, quality, target groups, partner institutions, time period and place). They should give an adequate picture of the situation. Furthermore, they should be measurable in a consistent way at an acceptable cost.

The following impact indicators for the **program objective** has been determined

- **The quality of watercourses in the Romanian catchment of the Danube River is improved to the 1st class, according to EU standards, for microbiological parameters, by 2010.**

  Because the main objective of the programme is focused on the reduction of the pollution in the Danube River catchment, it is very important to achieve this indicator. It can stress the improvement of the developed activities in the Romanian catchment of the river, from the point of view of the pollution. It was considered, that the microbiological pollution is one of the pollution types with serious transboundary effect.

The impact indicator for the **Agriculture and Land Use sector** have been identified as follows

- **Ecological reconstruction of wetlands according to "RAMSAR" convention by 3% the bad agricultural land in Danube flood plains, until 2003.**

  Due to improper agricultural practices used in the flood plains a lot of wetlands were very affected and also contributed to the water pollution. The reconstruction of the wetlands with 3% will contribute at the water pollution reduction in those areas. In the mean time will show what is the quantum of the negative influence of the agriculture practiced on the flood plains.

The impact indicator for the **Industrial Waste Management sector** have been determined as follows:

- **80% of industrial enterprises complying with the environmental requirements achieve EU standard environmental quality by the year 2005 while maintaining the level of industrial production of 1998, without loosing economic competitiveness.**

  Industry still represents for Romania one of the most important polluters, which is now in decline. This situation determined the water pollution reduction. It is very important to achieve this impact indicator which can be reached only using new technologies in the industrial production and for wastewater treatment.

The impact indicator for the **Municipal Waste Management sector** have been identified as follows:

- **Increasing water quality in Romanian rivers by 15% from degraded (D) - 3rd ; by 10% from 3rd - 2nd; 5% by 2nd - 1st according to Romanian standard 4706/1988 between 1998-2010.**

  The improper waste management coming from the municipal sector has a very strong impact on the water quality. In order to measure the results foreseen to be obtained in this sector, it is necessary to construct new wastewater treatment plants and landfills and to improve the existing ones. Only in these condition we cant achieve this indicator which will show the efficiency of the undertaken measures in the municipal waste management sector.

Program Planning Matrix

Summary of Objectives and Results	Impact Indicators	Important Assumptions
➢ **Overall Objective:** Sustainable development in the Danube River Basin	➢ In the main 12 river basins, the quality of the discharged treated waters is improved by 30%, in condition of economical development, by the end of 2020. (OO)	➢ Sustainable principles in regional policies are implemented for long term (OO)
➢ **Program Objective:** Pollution reduction in the Romanian catchment of the Danube river	➢ The quality of watercourses in the Romanian catchment of the Danube River is improved to the 1st class, according to EU standards, for microbiological parameters, by 2010. (PO)	➢ Financial international cooperation is extended (PO)
Sector Objectives: 1. **Agriculture and Land Use:** Appropriate use of the water and soil resources performed 2. **Industrial Waste Management:** Pollution prevention and abatement for industry achieved 3. **Municipal Waste Management:** Management of wastewater & solid waste improved	➢ Ecological reconstruction of wetlands according to "RAMSAR" convention by 3% the bad agricultural land in Danube flood plains, until 2003 (SO-ALU) ➢ 80% of industrial enterprises complying with the environmental requirements achieve EU standard environmental quality by the year 2005 while maintaining the level of industrial production of 1998 without loosing economic competitiveness. (SO-IWM) ➢ Increasing water quality in Romanian rivers by 15% from degraded (D) - 3rd; by 10 % from 3 rd - 2nd; 5 % by 2nd - 1st according to Romanian standard 4706/1988 between 1998 – 2010. (SO-MWM)	➢ The economical conditions are favorable (SO-ALU) ➢ Financial resources are provided (SO-ALU) ➢ Sustainable environmental economic policies at governmental level is supported and promoted. (SO-IWM) ➢ Inter-regional political cooperation is developed (SO-MWM) ➢ Sustainable behavior of population is achieved (SO-MWM)
Results/Outputs: **1. Agriculture and Land Use** 1.1. Appropriate agricultural practices – introduced 1.2. Appropriate management of the animal waste from animal farms - achieved 1.3. Efficient management of the forest - performed 1.4. Ecological farming practices and appropriate management of the hydro-technical works –implemented **2. Industrial Waste Management** 2.1. Clean technologies – implemented 2.2. Discharge of standard quality treated wastewaters – ensured 2.3. Proper management of solid waste management – adopted 2.4. Wastes transport adequately – performed **3. Municipal Waste Management** 3.1. Adequate management of wastewater - adopted 3.2. Pre-treatment of toxic & specific waters – performed 3.3. Proper management of solid waste – implemented		➢ Further implementation of correct agricultural policies already established (1.1) ➢ Provide sufficient funds for updating (reengineering) wastewater treatment plants (1.2) ➢ Achieve optimal profit/ecological balance ratio (1.3) ➢ Achieve optimal profit /ecological balance ratio in Danube Delta (1.4) ➢ Attracting funds from multiple sources available on time (2.1 - 2.4) ➢ Ecological awareness effectively increased (2.1 - 2.4) ➢ Priority of environmental protection within the government policies (3.1 -,3.3) ➢ Cooperation among all stakeholders (3.1 - 3.3) ➢ Supportive economic condition (3.1 - 3.3)

OO –Overall Objective PO – Program Objective
SO-ALU – Sector Objective of Agriculture and Land Use SO-IWM – Sector Objective of Industrial Waste Management SO-MWM – Sector Objective Municipal Waste Management

3. Sector Strategies

3.1. Agriculture and Land Use

Agriculture is today the most important economic branch for Romania, due to the natural conditions providing a very special agricultural potential. Nevertheless, this region has an ancient and well-known tradition in this field.

Agriculture includes all activities related to crops (including industrial and medicinal plants) and animal husbandry, together with technologies, equipment and the corresponding machinery.

Unfortunately, the present farming system, known as "conventional farming", produced both progressive social and economic results and serious environmental damages (upon its vital resources mainly: water and soil, and, consequently, upon bio-diversity as genetic basis), and upon human health as well.

Moreover, if we consider the potential synergetic effects (we must note also the fact that in several sectors, agriculture is both polluted and polluting), quite little known, it is enough for appreciating the present situation as unfavorable, but as very dangerous also.

3.1.1. Situation Analysis

3.1.1.1. Importance of the Sector and Activities Leading to Water Pollution and Environmental Degradation

Practically, all the agricultural area in Romania is included in the Danube river basin; anyway, 98% of the whole country area (less the Black Sea shore) is located in the same basin. Almost 36% of the population are working in agriculture, which is responsible for 18.5% in the GDP (1997). The present trends are an increasing share in the GDP, together with a decrease in the number of persons working in agriculture.

Consequently to the reforms that started in 1990, mainly to the Land Law (no. 18/1991), the share of different ownership types in agriculture and forestry shifted dramatically to private ownership (see Table 1).

Table 1: Agricultural area by use, 1989 – 1997

No.	Item	YEAR																	
		1989		1990		1991		1992		1993		1994		1995		1996		1997	
		'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%	'000 ha	%
I.	**TOTAL AGRICULTURAL AREA**	14759	100	14769	100	14798	100	14790	100	14793	100	14798	100	14797	100	14789	100	14789	100
	- public sector	4134	28	2309	16	4474	30	4394	30	4458	30	4426	30	4103	28	4095	28	4092	28
	- cooperative sector	8602	58	8266	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- private sector	2023	14	4194	28	10324	70	10396	70	10335	70	10372	70	10694	72	10694	72	10697	72
II.	**ARABLE LAND**	9458	100	9450	100	9423	100	9357	100	9342	100	9338	100	9337	100	9339	100	9336	100
	- public sector	1966	21	417	4	1976	21	1901	20	1888	20	1834	20	1530	16	1530	16	1524	16
	- cooperative sector	6578	70	6331	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- private sector	914	9	2702	29	7447	79	7456	80	7454	80	7504	80	7807	84	7809	84	7812	84
III.	**VINEYARDS**	278	100	277	100	286	100	299	100	304	100	299	100	292	100	289	100	287	100
	- public sector	87	31	43	15	89	31	84	28	81	27	79	26	72	25	71	25	69	24
	- cooperative sector	154	55	152	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- private sector	37	14	82	30	197	69	215	72	223	73	220	74	220	75	218	75	218	76
IV.	**ORCHARDS**	318	100	314	100	311	100	304	100	295	100	289	100	278	100	271	100	267	100
	- public sector	108	34	73	23	105	34	100	33	98	33	96	33	89	32	86	32	83	31
	- cooperative sector	140	44	137	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- private sector	70	22	104	33	206	66	204	67	197	67	193	67	189	68	185	68	184	69
V.	**PASTURES AND HAYFIELDS**	4705	100	4728	100	4778	100	4830	100	4852	100	4872	100	4890	100	4890	100	4899	100
	- public sector	1973	42	1776	38	2304	48	2329	48	2391	49	2417	50	2412	49	2408	50	2416	49
	- cooperative sector	1730	37	1646	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- private sector	1002	21	1306	27	2474	52	2501	52	2461	51	2455	50	2478	51	2482	50	2483	51

Source: *Changes in the Romanian Agricultural and Food Sector*, Ministry of Agriculture and Food, 1997 Annual Report, Bucharest, 1998, p.126.

Table 2: Fertilizers and manure used in agriculture, 1989-1997 ('000 tons)

Item	1989	1990	1991		1992		1993		1994		1995		1996		1997
			Total	of which: **private**	**Total**	of which: **private**	**Total**	of which: **private**	**Total**	of which: **private**	**Total**	of which: **private**	**Total**	of which: **private**	**Total**
FERTILIZERS - TOTAL *(active substance)*	**1159**	**1103**	**464**	**230**	**422**	**210**	**538**	**303**	**479**	**291**	**470**	**306**	**435**	**283**	**329**
Nitrogen (N)	666	656	275	143	258	138	346	204	313	200	306	208	268	181	235
Phosphoric (P_2O_5)	329	313	145	70	133	59	165	86	149	82	149	89	153	94	80
Potash (K_2O)	164	134	44	17	31	13	27	13	17	9	15	9	14	8	14
MANURE – TOTAL	**41603**	**24791**	**16910**	**13789**	**15792**	**12654**	**17125**	**14502**	**16945**	**14674**	**17423**	**15659**	**17871**	**16339**	**...**

Sources:

- *Changes in the Romanian Agricultural and Food Sector*, Ministry of Agriculture and Food, 1997 Annual Report, Bucharest, 1998, p.130.
- *Romanian Statistical Yearbook*, National Commission for Statistics, 1997, p.486.

This shift resulted, on one hand, in substantial positive economical changes, benefiting to the new owners, and on the other hand in stopping or even a decreasing pollution of natural resources: water and soil. This paradox is explained by the decrease of fertilizers and pesticides quantities used in agriculture (as a consequence of their excessive prices as compared to the financial power of the new farmers), as well as by quite frequent subsistence farming (see Table 2). This fact becomes more obvious if we take into account also the continuously restructuring process taking place presently in Romania. We should also add the fact that the land ownership is extremely scattered:

- over 2,600,000 landowners; the average size of the farm is 2.5 hectares;
- over 16,000 informal agricultural associations; the average size - 100 hectares;
- about 4000 formal agricultural companies; the average size - 450 hectares;
- over 1200 agricultural commercial companies; the average size - 1600 hectares.

In the future a consolidation of farms (increase of size) is expected, as a result of the new legal framework (some laws are already in force, other are still under debate):

- Law no. 54/1998, regarding juridical circulation of land (enabling the land market to function);
- Law no. 65/1998 for modifying and completing the Land Lease Law;
- Law for modifying and completing the Land Law.

The latter, still under debate, will give back to the former owners a land area up to 50 hectares (forest included), creating opportunities for new potential pressures upon the environment in general, and more precisely in relation to irrational forest harvesting.

A significant change occurred in the market behavior of the agro-chemicals producers: they started providing their products on credit (reimbursable at harvest time); this specific fact results in an increase of agro-chemicals use by the farmers, with direct effect upon pollution.

If diffuse pollution is specific for crops technologies (including use of inadequate machinery for tillage), concentrated point pollution is specific for animal husbandry activities. Despite a sharp decrease in head numbers (see Table 3), there still exist 95 large animal husbandry units (pigs, poultry, cattle or mixed), directly linked to the natural receivers; out of which 62 units are still heavily pollutant, 15 units are working properly and the resting 18 ceased working.

Disposal of animal waste on platforms or drying beds with inappropriate or no treatment (mainly in the pig farms, where also large volumes of wastewater result) lead to the impossibility of reintroducing it in the natural energy cycle (through fertilization in field) and result in disposing beyond the safety capacities or - more seriously - in the drainage channels, and from here to the emissary.

If we take into account also the technical state - critical quite frequently - of constructions and equipment such as ponds or waste pits, old or inefficient technologies we have a broad image of the environmental situation in agriculture (not to mention accidental pollution).

Table 3: Livestock number by the end of the year, 1989 - 1997 ('000 heads)

Item	1989	1990	1991	1992	1993	1994	1995	1996	1997
CATTLE	**6291**	**5380**	**4280**	**3683**	**3597**	**3481**	**3496**	**3435**	**3283**
- private sector	5147	4409	3474	3010	3050	3056	3133	3103	3048
- state sector	1144	971	806	673	547	425	363	332	236
COWS AND HEIFERS	**2468**	**2122**	**2266**	**2025**	**1979**	**1963**	**1983**	**1939**	**1826**
- private sector	2149	1848	2027	1818	1796	1804	1842	1812	1731
- state sector	319	274	239	207	183	159	141	127	95
SHEEP	**16452**	**15067**	**14833**	**12884**	**12276**	**11642**	**11086**	**10317**	**9645**
- private sector	13722	12801	12909	11319	11033	10561	10177	9592	9205
- state sector	2730	2266	1924	1565	1243	1081	909	725	440
EWES	**9989**	**9747**	**12230**	**9467**	**9147**	**8591**	**8202**	**7662**	**6707**
- private sector	8711	8547	11128	8507	8356	7940	7643	7190	6416
- state sector	1278	1200	1102	960	791	651	559	472	291
PIGS	**11671**	**12003**	**10954**	**9851**	**9262**	**7758**	**7960**	**8235**	**7133**
- private sector	5584	5911	5455	5381	4911	4415	4614	4766	4591
- state sector	6087	6092	5499	4470	4351	3343	3346	3469	2552
SOWS	**1023**	**951**	**772**	**792**	**678**	**576**	**591**	**584**	**529**
- private sector	467	440	326	395	327	290	305	305	315
- state sector	556	511	446	397	351	286	286	279	214
POULTRY	**113968**	**121379**	**106032**	**87528**	**76532**	**70157**	**80524**	**78478**	**68915**
- private sector	56231	58418	53223	46192	44006	46340	50869	54289	57025
- state sector	57737	62961	52809	41336	32526	23817	29655	24189	11890
LAYING HENS	**49390**	**51475**	**50213**	**42396**	**37980**	**36233**	**38575**	**38883**	**30421**
- private sector	34920	35225	34304	31122	29130	29192	30378	31842	27217
- state sector	14470	16250	15909	11274	8850	7041	8197	7041	3204
HORSES	**663**	**670**	**749**	**721**	**751**	**784**	**806**	**816**	**818**
- private sector	599	623	707	682	716	756	782	794	804
- state sector	64	47	42	39	35	28	24	22	14
BEES ('000 families)	**1201**	**1091**	**1207**	**753**	**703**	**683**	**658**	**632**	**632**
- private sector	1064	978	1140	695	654	645	624	605	617
- state sector	137	113	67	58	49	38	34	27	15

Source: *Changes in the Romanian Agricultural and Food Sector*, Ministry of Agriculture and Food, 1997 Annual Report, Bucharest, 1998, p.127.

The stakeholders having important responsibilities and tasks regarding the inadequate agricultural practices are: the policy level organizations (such as: Ministry of Agriculture and Food, Ministry of Waters, Forests and Environment Protection, local Environment Protection Agencies, "Romanian Waters" Regie Autonome (RWRA), Land Reclamation Regie Autonome (LRRA), Academy for Agricultural and Forestry Science (AAFS)), polluting groups, polluted groups of farmers, we tare talking in fact about the whole population living in that area.

Ministry of Agriculture and Food is the central authority elaborating agricultural strategies and policies. It has a branch in every county (General Directorates for Agriculture and Food (GDAF)), which are monitoring the implementation of the policies and strategies into practice all over the country. The Land Reclamation Regie Autonome is managing the soil quality and the quality of hydro-salty ecological factors in order to perform an efficient farming, less influenced by major weather and climate fluctuations (drought, flood, soil erosion).

Research transfer and implementation is the responsibility of the Academy for Agricultural and Forestry Sciences, together with its subordinated research institutes (such as Research Institute for Agri-chemistry and Soil Science, Institute for Studies and Engineering for Land Reclamation, Institute for Agricultural Economics etc.) and research stations all over the country. Main results are new technologies, plant varieties and animal breeds, high yielding and optimally adapted to each eco-systemic area. The Research Institute for Agro-chemistry and Soil Science has its own database as well as a monitoring system for soil quality.

Ministry of Waters, Forests and Environmental Protection is the central authority related to environmental protection and related legislation. Its main task is to control and regulate waters and forests by means of specialized departments. A network of territorial county branches (Environmental Protection Agencies and Forestry Inspectorates) covers the whole country. There is also the "Romanian Waters" Regie Autonome (RWRA), having as well branches in each inland important river basin, administering and permanently supervising the water resources.

The main polluters in agriculture are: large animal husbandry units, crop and fruit-tree farms, mechanical companies, agricultural land and forest owners, irrespectively of their ownership type.

Water producers (RWRA), down-stream units and agricultural landowners represent the affected group. Finally, the whole population is experiencing the pollution shock, by means of various uses of the water resources (tourism - leisure, fishery polders, irrigation, household and industrial consumption etc.). Last but not least, water pollution is affecting bio-diversity; in this respect, the most affected area is the Danube Delta Biosphere Reserve (DDRV) (580,000 hectares area, 955 flora species, 322 birds species, 2,419 insects species, 70 mollusk and crustacean species, 160 fish species, 9 amphibian species, 16 reptile species and 40 mammals species), which is practically collecting the waters from the whole Danube river basin.

The main agricultural activities directly contributing to water pollution identified during the Workshop are:

- Use of inadequate agricultural practices ;
- Inappropriate forest management;
- Inappropriate management of animal waste from animal farms;

Inappropriate agricultural practices within protected areas (Danube Delta) and improper hydro-technical works performed in the Danube flood plains and Delta.

3.1.1.2. Current Strengths/Assets

Inadequate agricultural and forestry activities, as well as the inappropriate management of animal waste from animal farms put a permanent pressure upon the surface and ground waters network, with a final impact upon the Danube Delta. Intensive farming, as well as extensive, based upon permanent increase of arable land, together with artificially forced increase of soil fertility are obviously resulting in time in a decrease of humus content, in dangerous chemical residues, and hence, to water resources.

Estimates show that in Danube flood plains there is a surplus of 48 kg/ha N, 56 kg/ha K and 76 kg/ha P, which means that their usage efficiency is 65%, 25% and 27% respectively. Massive wood cutting and insufficient afforestation are leading to harmful weather and climatic changes, as well as to an increase of flowing coefficients in the surface waters. All the above mentioned have direct effects upon flowing capacities, soil wash-out, leading finally to different pollution types (physical, mechanical and chemical), including by inducing accidents (catastrophic sometimes).

Insufficiency or lack of wastewater treatment plants in the animal husbandry farms is responsible for water pollution with different compounds of animal waste, either by direct discharge in the emissary, or by disposal in places which do not provide a proper protection of ground waters. The pollution degree of the above mentioned, as well as different self-cleaning capacities of emissaries (generally aggressed from multiple directions), added to intensive - extensive farming in the Danube Delta, are considerably increasing the risk for severe natural disbalances both in bio-diversity structure and public health sector.

For the agriculture and land use sector the following strengths/assets are available:

- **Existence of database & monitoring system**

  In time, but mainly after 1990, a special attention was paid to the inventory of the existing databases. Several programs were carried out for identifying potential data holders (mainly research and studies institutes), but the Regies Autonomes too (RWRA, LRRA), which have generally their own water and soil monitoring system. There are special monitoring departments in MWFEP too, mainly for phenomena causing natural disasters.

- **Existing environmental legislation**

  The main organic law regulating the environmental issues in Romania is the Law for Environmental Protection (no. 137/1995). This law is completed by different other laws and regulations, specific for agricultural and forestry activities, such as: forestry code, grazing regime, Waters Law and Land reclamation Law. Moreover, the standardization activity is closely linked to the international environmental norms and regulations, in order to facilitate compliance with engagements and obligations pursuing to international treaties.

  The main national environmental legislation presently in force is including:

  - Minister's Order[1] no. 485/1995: "Regulations for organizing and functioning of the alarm system in case of accidental water pollution in Romania";
  - Minister's Order[1] no. 171/1995: "Regulations for organizing, functioning and performance of state forestry control in managing the forestry fund, the outer vegetation, as well as the hunting and salmon areas";
  - Minister's Order[2] no. 50/1993: "Several measures for protection of rare wild and migrating fauna species under extinction threat, reintroduced in Romania";

[1] Minister of Waters, Forest and Environmental Protection
[2] Minister of Agriculture and Food, Minister of Environment, Minister of Industry and Resources and Minister of Health

- Ministers' Common Order[3] no. 15/1991 regarding "Producing, trading and using pesticides in agriculture and forestry";
- Minister's Order[3] no. 7/1988: "Measures regarding environmental protection in agricultural activities;
- Minister's Order[3] no. 20/1985: "Forbidding the use of organo-chloride insecticides based on DDT and technical HCH";
- Minister's Order[3] no. 111/1979: "Technical norms for soil quality protection";
- Government Ordinance no. 4/1995 regarding "Producing, trading and using phyto-sanitary products for disease, pest and weed control in agriculture and forestry";
- Government Decision no. 511/1994 regarding "Enforcement of measures for preventing and control of environment pollution by commercial companies";
- Government Decision no. 971/1994 regarding "Ascertaining and penalizing infringements of fishing and fishery fund protection norms";
- Government Decision no. 138/1994 regarding "Ascertaining and penalizing infringements of water related regulations";
- Law no. 107/1996, "Waters Law";
- Law no. 84/1996, "Land Reclamation Law";
- Law no. 26/1996, "Forestry Code";
- Law no. 82/1993, regarding "Setting up the Danube Delta Biosphere Reserve";
- Law no. 12/1974, "Fishery and Fishing Law";
- Law no. 8/1971, regarding "Organizing, administering and using the pastures and animal husbandry plots".

➢ **On going international programmes (Phare, ERBD, UNDP…)**

International environmental programmes focusing on Danube River Basin and Danube Delta Biosphere Reserve are generally funded and monitored by Phare, ERDB and UNDP. Here are some examples: Nutrient Application in the Danube Delta, Ecological Demonstration Farm etc.

➢ **Existing bilateral and multilateral agreements on Danube, Prut, Tisa, etc.**

Romania is a significant part of the Danube River and Black Sea Protection Convention. There is a significant activity carried out in this respect both at government and non-government levels. The bilateral treaties regarding the use of boundary rivers (Danube, Prut, Tisa) concluded with Yugoslavia, Bulgaria, Moldavia Republic and Hungary are as many opportunities for protecting those rivers.

The main international environmental agreements/conventions presently in force are:

- Convention on the Protection and Use of the Water Courses and International Lakes (Helsinki, 1992);
- Convention on Black Sea protection against pollution (Bucharest, 1992);
- Convention between the Romanian and Bulgarian Governments regarding collaboration in environmental protection (enforced as Law 97/1992);
- Convention upon biological diversity (Rio de Janeiro, 1992; enforced as Law 58/1994);
- Convention on the conservation of wild life and of the natural habitats in Europe (Bern, 1979; enforced as Law 13/1994);
- Convention upon internationally important wet areas, mainly as habitat for aquatic birds (enforced as Law 5/1991);
- Convention regarding cooperation for sustainable protection and use of the Danube River (Sofia, 1994; enforced as Law 14/1995).

[3] Minister of Agriculture and Food Industry

- **Ecological reconstruction funded by World Bank**
  The World Bank has several on-going programmes in the Danube Delta.

3.1.1.3. Analysis of Transboundary Effects

The following transboundary effects have been considered:

- **Affecting bio-diversity in the Danube and the Danube Delta**
  Inadequate farming practices in the Danube flood plains and Delta as well as in inland rivers flood plains, together with the inappropriate management of animal husbandry, units result in transport of important polluters into Danube River and hence, in the Danube Delta (mainly NPK compounds and pesticides residues).
  This transport is considerably intensified (sediments/alluvia included) by the increased flowing coefficient in the surface waters, due to excessive woodcutting. Once arrived in the Danube River and Delta, these substances are aggressive to water quality and bio-diversity implicitly. These effects might have transboundary character if we take into account the vicinity of Yugoslavia, Bulgaria, Moldavia Republic, Ukraine and Hungary. Moreover, the Danube flood plains and Delta represent also a permanent regeneration (spawning) space for several marine fish species (such as sturgeons and mackerels) which might be disturbed.
- **Affecting the water quality parameters**
  Affecting the water quality the way it is described above is harmful not only because it is reducing bio-diversity, but mainly because it is reducing the using potential of the water (water supplies, tourism and leisure).
  The Prut, Tisa and Danube rivers should be mentioned here for their transboundary effects in Moldavia Republic, Hungary, Yugoslavia, Bulgaria and Ukraine, as described above.
- **Changes in flow regime**
  The changes occurring in the flowing capacities resulted from various activities as:
  - embankment works in Danube flood plains and Delta;
  - drainage works in Danube flood plains and Delta;
  - irrigation works in Danube flood plains and Delta;
  - important hydro-technical works (dams, barrages) on inland rivers and Danube;
  - massive deforestation.

The cumulated effect of all these activities is leading to important changes in the flowing capacity regime, having as main features:

- an increased gap between minimum and maximum flowing capacities, and hence either non-compliance of minimum admissible regime for down-stream users, even restricting the sanitary regime on inland rivers;
- extreme overflows, resulting in non-compliance with international conventions related to high water levels.

Mostly affected by this highly non-beneficial balance is the Danube Delta, which is a young area (still under formation), extremely sensitive to any distortions caused by hydrological and soil balances sensibly different from the natural evolution.

As a result of the Romanian Danube River Basin and Delta position, practically the whole polluting effect induced by the preceding countries in the basin is a potential downstream transboundary effect.

3.1.2. Sector Problem Analysis

3.1.2.1. Core Problem

"INADEDQUATE USE OF WATER AND SOIL RESOURCES"

The main resources in efficient farming are water and soil. The soil quality as well as the accessibility of water resources in the Carpathian - Danube - Black Sea area, together with several favorable ecological factors generated a tradition in crops growing and animal husbandry. For these reasons it is relatively difficult to preserve the two mentioned resources, the more so as under conditions of environmental unfriendly farming practices.

3.1.2.2. Causes Leading to Environmental Problems

In identifying the causes leading to water and soil pollution, two levels of the cause-effect principle were defined: direct and indirect causes (sub-causes). This chain including identified and analyzed causes resulted finally in emphasizing several direct causes of the sector core problem.

The following direct causes of the sector core problem have been identified:

- Use of inadequate agricultural practices
- Inappropriate management of animal waste from animal farms
- Improper forest management
- Inappropriate agricultural activities within protected area (Danube Delta) and improper hydro-technical works performed in the Danube flood plains and Delta.

Obviously, a particular delimitation of the Danube Delta Biosphere Reserve was needed.

These problems have other direct causes. An explanation of each of these problems together with their cause-effect relation will be given below:

(i) Use of inadequate agricultural practices

The changes occurred in spheres of influence in the '40s, as a consequence of World War II, put more pressures upon the Romanian economy in general, and especially in agriculture, forcing the latter to face continuously increasing requirements. Later, in the '70s and '80s the pressure of the public foreign debt weighted again on agriculture mainly. Under these conditions, Romania was forced to a very harmful use of water and soil resources from an ecological point of view, thus worsening the state of the natural environment.

The main three causes that we named indirect causes (sub-causes) of the present situation are as following:

a. Improper technical means and technologies

For a long time, Romania had to face some technical and technological needs - in agriculture mainly - achieved using its own means only and with no access to know-how, while the production requirements were continuously increasing. In this unfavorable political and economical context, the specialists were obliged to confine themselves to their own forces only, resulting in an overbidding of their skills, not always with positive results. This technical and technological isolation during the latest years might be charged to **insufficiency of financial resources**, as well as to **the lack of involvement of the Romanian industry in satisfying the needs in agriculture**.

The insufficiency of financial resources is directly linked to the **lack of** efficient subsidies, and both are a result of **unfavorable economic environment and market conditions**.

b. Incomplete or unobserved legislative framework

Despite the existence of a rich legislation package enforced after 1990, it seems that Romania is still expecting those really useful laws for the present transition period. This relatively general idea on the Romanian economy is strengthened also by the non-compliance in a steady and efficient way of the presently enforced laws. This situation is continuing due to **inadequate agricultural policies**, to changes in the **ownership patterns** and to **insufficient staff for controlling and application of legislation**.

In the first case, agricultural policies are under continuous adjustment, in order to find the best solutions to fit the Romanian circumstances.

Not necessarily a sub-cause, the continuously **changing legislation due to transition and alignment to EU regulations** is being delayed mainly consequently to lack of budgetary resources. Agricultural land market requires specific laws, including some which should motivate agricultural activities, but should have as well coercive provisions to prevent irrational farming. **Limited budgetary resources** are representing the immediate sub-cause of poor control of compliance with the enforced legislation.

c. Low level of qualification and information of farmers

It is generally agreed the existence of an **inefficient extension system, an inadequate information system** and the **lack of an adequate training system**. These facts are based mainly upon the present impossibility of making them operational, due to lack of interest shown by the new agricultural land owners, while their average age is old enough to draw their attention in an organized way. Therefore, a special attention should be paid to find the best way to train the young beginner farmers, thus reviving a good and solid tradition which was brutally interrupted by the massive migration to urban areas during the accelerated industrial development in '60s and '70s, which resulted in a large scale depopulation in rural areas.

(ii) Inappropriate management of animal waste from animal farms

For a long time, meat and meat products held an important share in the Romanian exports, therefore the production was intensified each year. The capacity of the animal husbandry farms was continuously increased, without increasing accordingly the capacities of the wastewater treatment plants and of solid waste disposal platforms, nor building new ones or using modern technologies. This resulted in a severe worsening of environmental problems. In the same time, the relatively low efficiency of these farms (5.5 kg feed/ kg liveweight), together with controlled low prices able to compete on international markets with more efficient foreign producers, finally left no financial chance for any technological update or environmental investments.

The main two causes of the present situation are as following:

a. Improper sanity condition in from animal farms

In addition to the above mentioned aspects, if in the past compliance with a more or less restrictive environmental legislation was not even taken into discussion. Presently the **weaknesses in applying legislation** represent a serious hindrance, caused also by **insufficient staff for monitoring and control**, but by other less objective reasons as well.

Limited financial resources can be found again, at the same level; its own range of sub-causes is including poor economic development, lack of interest and political reasons of the moment.

As a general remark, presently Romania has other priorities related to allocation of financial resources targeted to environmental protection; therefore, environmental investments - as many as they are - rely on the private sector and on international grants and programmes, with only small contributions from the Romanian authorities.

b. Inefficient wastewater treatment

One of the direct causes of the inefficiency is **under-sizing of wastewater treatment plants**, together with an inappropriate planning in the animal husbandry technologies too. Both deficiencies lead to engineering errors, lacking the appropriate technical and scientific support as well.

Outdated wastewater treatment technologies - due to a bad economic situation -, together with the impossibility to obtain or attract funds for equipment and technologies updating are the second direct cause of inefficient wastewater treatment plants. The existence - in the past - of huge export plans led to forcing by all means the animal production (it was applicable for crops too), under insecure sanitary and technological conditions, which probably accelerated the wearing out of equipment, some of it being already inefficient, therefore inappropriate.

The last important cause to be mentioned is represented by **operational weaknesses**, for which unfavorable work conditions, low interest of staff due to payment and low level of operational staff skills are equally responsible. As a direct result, there is a permanent fluctuation of skilled personnel, equally due to restructuring and hence, employment uncertainty. For these reasons, important concessions were made regarding the staff qualifications and skills, so the personnel did not respond always to the real needs of rational operation.

(iii) Improper forest management

Together with crops and livestock production, forests, with good quality species represent an important asset of the Romanian economy. The various essences are intensively harvested in order to provide raw material to important consumers. Unfortunately, the forestry code is not always complied with, due to the fact that some forestry areas went into private ownership quite recently.

Excessive forest harvesting which was not accompanied by the necessary afforestation (in fact, shifting the land use from forests to pastures, hayfields and even arable land) resulted in important soil erosion mainly on slopes, in increasing of flowing coefficients for surface waters, even in micro-climatic and bio-diversity changes in certain areas. All the above mentioned have an unwanted effect in time upon water and soil resources, as well as upon aquatic and edaphic eco-systems.

The main direct cause of improper forest management is:

a. Non-compliance with forest harvesting principles according to the forestry code

The forestry patrimony was submitted lately to important stress, in complete disrespect of the forestry code - a wild aggression of economy upon ecology. If certain abuses of the new owners are understandable to a certain extent, vandalism in state owned forests is completely unacceptable. Deliberate ignoring of forestry code is due to ***immediate economic targets***.

Of course, in the case of new owners, causes might be related to the **unawareness or ignoring the effects of such abuses**, as well as to the **lack of an efficient training and information system**.

In the other case (state owned forests), the situation is completely unacceptable, despite the fact that in this case as well, contradictions are generated by certain conflicts of interests.

(iv) Inappropriate agricultural practices and improper hydro-technical works performed in the Danube flood plains & Delta

Both the Danube flood plains geo-system, as well as the Danube Delta biome are the most illustrating examples of inadequate use of lands, mainly for growing cereals. If we consider: (1) the pastures forcibly shifted to arable land use, (2) those large areas with primary salty soils or with other natural deficiencies submitted to so-called "improvement works", costing enormous efforts and energy consumption, but yielding poor results, and (3) hydro-technical works in the Danube flood plains and Delta; we have a self-evident image of the meanings for "bad land use". This is the extremely important reason for which we chose to make the specification even in the sector title.

a. Change of hydrological regime in the Danube Delta & upstream the Delta

Along the Romanian sector of the Danube flood plains, 43 agricultural units (total area - 450,000 hectares) are protected against flood. The total length of the protecting embankments is about 1,100 km. About 150 km of embankments creating compartments should be added too. Performing these works supposed draining practically all the marshes in the flood plains. Consequently, the hydrological regime was submitted to sudden changes, and the natural processes related to soils were interrupted. The fauna and flora diversity decreased, and the trophic balances were affected, mainly in relation with the fish fauna, due to the fact that the marshes and the annual floods held vital functions in the eco-system, in microclimate also. Moreover, the hydrotechnical works performed in the Danube tributary flood plains broke the natural hydrological regime. If we add the great dams on the Danube, the navigation channels as well as the other channels (for industrial and energy use), Danube Delta included, we realize once more the reality of anthropic changes induced to the natural hydrological regime.

The main sub-causes are: **inadequate construction and operation of hydro-technical works**, resulting mainly in water level fluctuation up-steam and between the two power plants when they start working, not taking into consideration neither the sensitive biological periods of the fish fauna, nor the dilution parameters. Another example is the irrational equipment of the Greaca marsh with roads network. The marsh bottom is at the Danube multi-annual average minimum level, therefore the roads are permanently, and the marsh bottom is still not yet drained.

Irrational extension of channels for access to natural resources in the Danube Delta (drainage channels included), as well as of dikes, resulted in stream changes, thus distorting the natural formation and conservation regime in the Delta.

b. Inadequate use of natural resources

The inadequate use of natural resources is related to the **setup of intensive fish farms in the Danube Delta**, favoring penetration of alien species, which shifted the normal pray - predator relationship towards the latter.

Another reason of inadequate use of natural resources is the inappropriate exploitation of reed in the Danube Delta. This activity caused the destruction of many habitats, mainly winter habitats (the period for reed harvesting) of many birds species, not to mention the mutations occurred due either to water pollution, or to exaggerated food consumption of alien fish species artificially introduced in the Danube Delta.

Last but not least, **intensive farming on about 80,000 hectares** artificially reintroduced in arable land category, as a result of an inadequate land policy in the past.

It is worthwhile mentioning that everything was possible due to pursuance ***of immediate economic targets*** **and** ***unawareness of the effects in time***.

c. **Hydro-technical works, which produce negative effects on environment in the Danube Delta**

It is obvious that not all the hydro-technical works produced negative effects in the Danube flood plains and Delta. It is needed only their correct identification and study due to the fact that they represent the last analyzed cause.

3.1.2.3. Environmental Effects

Beyond any doubts, **sector core problem** is quantifying a logical cause-effects branch. Its correct spatial distribution is easily to imagine and conceive in plane representation. At this stage of the analysis, it is less important to import nuances, but much more important to identify the environmental causes of such brutal activities, as following:

The environmental consequences of inappropriate activities are the following:

- **Changes in hydrological regime**

  It is normal to expect such changes as a result of hydro-technical works already mentioned. Above these, we see an increase of the flowing coefficient as a result of deforestation, leading at its turn to an increase of surface flows degree, as well as, in a lesser extent, micro-climatic changes, including through reduction of lake area in wet areas. These changes mean practically breaking certain already known cycles, as well as increasing the gap between minimum and maximum, while decreasing occurrence coefficients (given by calculations).

  All these aspects are sensibly aggressing the water and soil resources, both in terms of accessibility and quality. Practically, this consequence is closely linked to the **inadequate use of natural resources** and to **hydro-technical works producing negative effects** (both at the same level). It is also an important point of the network, having direct implications in three out of four direct causes (except for inappropriate management of animal waste from animal farms). Its own sub-causes are practically all the above mentioned structural projects.

- **Eutrophication of natural and artificial lakes**

  Eutrophication is considered to be one of the most important surface water pollution. It is a direct result of **inadequate water and soil resources**, as well as an immediate cause of water resources degradation. It is the consequent effect of all the four causes/problems defining the **core problem.**

- **Affecting surface and underground water quality**

  This effect is again a consequence of simultaneous pollution, obviously in direct relationship with **water resources quality**, and hence, **bio-diversity degradation** on one hand, and **decrease of the using potential of water sources**.

- **Soil pollution**

  In Romania there are about 150,000 hectares with important anthropic pollution. Inadequate forestry and agricultural practices represent the main cause, which sometimes accelerate natural phenomena. This consequence is related too to the four causes/problems, having a severe and distinct effect in reducing soil resources.

- **Pastures degradation**

  It is an immediate and direct effect of **use of inadequate agricultural practices and improper forest management**. The next effect along the chain is degradation and limitation of soil resources, with implications at already known higher levels (bio-diversity degradation and soil resources degradation).

- **Soil erosion**

  It is obviously the natural cause of three causes/problems, easily identifiable. Practically, in the problem tree it has the same features as soil pollution. Unfortunately, in Romania, over 1,000,000 hectares are affected by soil erosion, as a consequence of worsening and overlapping with natural causes (hydraulic and wind erosion). The main aggressive factors are: vertical plowing on sloping land (from top to bottom), growing row-crop species and reduction of timberland.

- **Land regression in the Danube Delta**

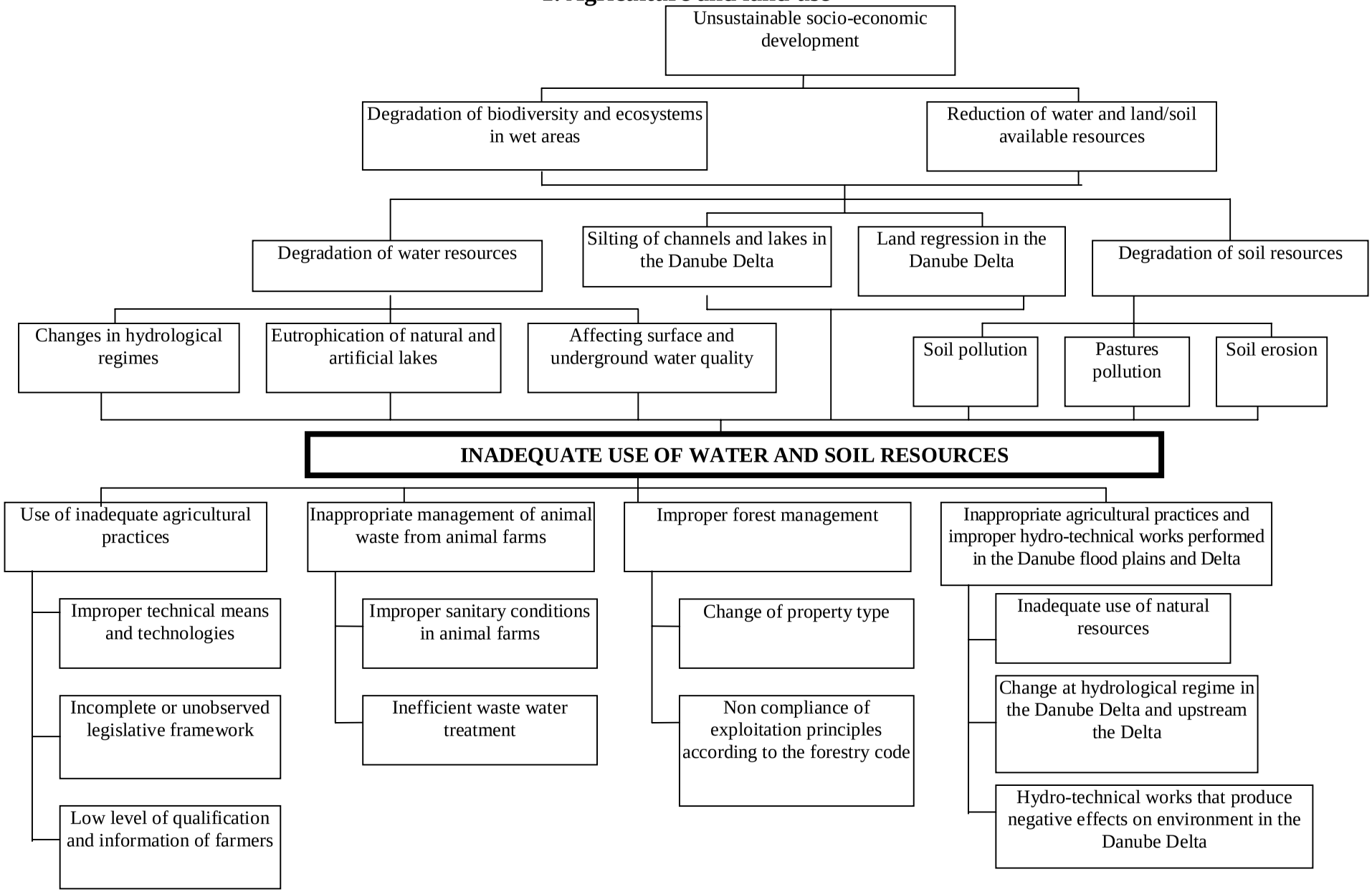
  On one hand we are identifying a strong erosion in the Danube River basin, which naturally should be found in the deposits in the Danube Delta, and on the other hand the Danube Delta is experiencing land regression (a 7-12 hectares loss yearly). This phenomenon is the result of reduction of the transported alluvia quantity, due to the silting both the reservoirs performed in the Danube River catchment and the Danube Delta itself. For instance, the transported alluvia quantity by the Danube River was reduced by 50% after the construction of the Iron Gates reservoirs. Even in the Delta there is a complex process of erosion and silting, resulting in increases of the river Delta and regression of the marine Delta, as a consequence also of erosion in the sea shore due to the sea dikes.

All the above mentioned effects have significant consequences on each level of the problem tree, up to **unsustainable social and economic development**.

As a conclusion to this paragraph, we should note that both the Danube flood plains and the Delta have limited natural possibilities for ecological regeneration and reconstruction in convenient time periods (an anthropic damaging/resonance coefficient over 60% is considered to be the threshold for natural eco-systemic irreversibility).

PROBLEM HIERARCHY

1. Agriculture and land use



3.1.3. Objectives, Expected Results, Actions and Related Projects

Analyzing the problems and the problem tree, the following sector objective has been identified:

"APPROPRIATE USE OF WATER AND SOIL RESOURCES"

Once achieved, this objective will ensure the preservation of the two resources (water and soil), as well as of the bio-diversity, facilitating a sustainable social and economic development, taking advantage also of the fact that presently Romania is aiming to a complete restructuring of its economy.

Under these conditions, and in order to achieve the sector objective, it is necessary to accomplish in the meantime the following results:

- Introduction of appropriate agricultural practices
- Achievement of appropriate management of the animal waste from animal farms
- Performing of efficient management of the forest
- Implementation of ecological farming practices and appropriate management of hydro-technical works

(i) Introduction of appropriate agricultural practices

This seems to be the most important result; in order to achieve this result, several activities have to be undertaken in the following fields:

- Technical and technological means
- Favorable economic environment
- Farmers qualification and information

It is necessary to:

- **provide appropriate technical and technological means**. In order to do this, the first step should be a correct assessment of the existing situation, and the promotion of realistic agricultural policies. The promotion of coherent agricultural policies is the key or red line of the path to follow.

  In order to provide appropriate technical and technological means a financial support mechanism for ecological farming has to be developed. This is a very important element that might extend if there is a market for such products.

  The use of appropriate machinery and land organization, mainly in the areas with new private owners is as much important as favoring associative farming, thus providing better conditions for the use of modern technologies.

  In this context, ecological reconstruction of affected areas might be considered if at least some facilities are provided (such as tax exemption on re-invested profit, low interest credit lines etc.).

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - Ecological reconstruction of Zlatna area (Mures river basin)
  - Rapid data collection by satellite for dangerous hydro-meteorological phenomena
  - Model farms of ecological agriculture

Planned Projects

- Reclamation technologies of agricultural soils affected by oil and salted water pollution in river tributary basin : Crisul Alb, Crisul Repede, Olt, Arges, Ialomita, Siret
- Ecological reconstruction of agricultural soils – Baia Mare
- Ecological reconstruction of poor agricultural land in Romanian Danube river basin
- Development of a monitoring system for chemical soil pollution in agricultural areas in Romanian Danube river basin
- Monitoring of protected areas in Romanian Danube river basin
- Development of rapid dissemination of information regarding flood propagation in Romanian Danube river basin
- Dams rehabilitation along side Danube river from Iron Gate km. 875 to Isaccea km.103
- Consolidation and rehabilitation of sliding lands in Zalau city (Somes River basin)
- Inventory of areas under risk of landslides
- Rehabilitation of irrigation and drainage systems in the Danube flood areas

Proposed Projects

- Study on ecological reconstruction by controlled flooding of embanked areas in Jijia river meadow
- Study regarding sizing the protection area in relation with the use of chemicals in the river meadows
- Identification of control eco-systemic areas and their preservation
- Standard projects on ecological and land use monitoring
- Setup of thin protective forests in the dam-riverside area (Danube flood plain)
- Ecological reconstruction of the Greaca lake in the Danube flood plain (Giurgiu and Calarasi counties)
- Study on the size of fauna population in agriculture ecosystems.

➢ **create favorable economic environment.** In absence of a healthy economic environment (where the demand-supply principle is properly functioning), it is practically impossible to revive the Romanian agriculture. Achieve stability of ownership patterns might represent the start of a beneficial activity.

It is also important to setup of market mechanisms which will enable to provide facilities for less favored rural areas, while improving infrastructure will contribute, together with development of agro-tourism, to improve comfort and civilization degree in rural areas, resulting in good economic effects, beneficial to the local population.

An efficient control of compliance with legislation, while providing facilities for environmental investments may contribute significantly to an economic revigoration in the agricultural sector.

For this activity, the following projects have been identified:

Existing/On-going Projects

- Legislative initiatives (exemption from taxes on profit, land, etc…)
- Amendments to Land Law

Planned Project

- Specific legislation for less – favored areas.

- **achieve a high level of farmers' information and qualification.** After reconsidering local traditions and cultural elements, ecological promotion actions to increase awareness to young people in rural areas will be organized. It is also planned to set up rural management schools in order to educate and inform farmers about ecological agricultural practices. In this context it is necessary to train operational staff and attract high skilled technical staff to rural areas by eliminating rural-urban disparities.

  Resuming the practices of "clean" farming involves both a new qualification for new-comers (or those which have been working in industry for a long time), as well as for older farmers, in order to help them adapt to the new requirements.

  For this activity, the following projects have been identified:

  Existing/On-going Project

  - Training and extension programmes

  Proposed Projects

  - General business plans for farmers
  - Farmers' guides for different activities.

(ii) Achievement of appropriate management of the animal waste from animal farms

A proper management of animal waste might solve somehow the pollution problem, but that is depending again of the financial resources. This is the reason for looking also for other solutions, less dependent of these resources (such as use of manure in the fields), reducing the pollution intensity by splitting up the huge animal farms - the existing infrastructure from the closed units might be used - etc.).

In order to achieve this result, several the activities are required in the following areas:

- Sanitary conditions in animal farms
- Wastewater treatment

It is necessary to:

- **ensure optimal sanitary conditions in animal farms**. In our opinion, the starting point should be an *inventory of immediate needs*, then. We think also that *to develop policies in line with local requirements and market considerations* to *split the huge animal farms into smaller units* will considerably reduce the pressure upon the wastewater treatment plants, thus improving their efficiency.

  It is required to promote construction of wastewater treatment plants, considering capacity optimization. In order ensure optimal sanitary conditions in animal farms, it is necessary to provide necessary financial resources for constructing them. These are important elements that are able to eradicate many unwanted effects.

  Comply with environmental legislation and provide incentives as well as applying coercive regulations might contribute essentially to increase respect for ecology and environmental protection.

  For this activity, the following projects have been identified:

  Proposed Project

  - Feasibility study regarding splitting the huge pig farms into smaller units.

- **perform an efficient wastewater treatment**. The quality of the wastewater treatment is mostly dependent of the performances and efficiency of equipment in the plant. This is the reason, why ***updating and rehabilitating of the existing wastewater treatment plants*** and ***introducing modern technologies*** is a major criteria of this activity.

  Moreover, it is required to promote modern animal husbandry practices (with low water consumption). It is also necessary to really operate and manage in an appropriate way the wastewater treatment plants. This should result in an obvious success. Other important elements in order to accomplish this result are to employ skilled operational staff and ensure efficient monitoring and control.

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - Spreading in the fields the solid waste resulting from wastewater treatment plants (experimental)
  - Irrigation with wastewater (experiments) in Peris and Crevedia
  - Orientation of agriculture to a rational use of animal waste (Peris)

  Planned Projects

  - Capacity increase of wastewater treatment plant of COMTOM Tomesti (Prut river basin)
  - Recycling and management of animal waste from animal farms (Romanian Danube river basin)

  Proposed Projects

  - Use of zeolytes in wastewater.

(iii) Performing of efficient management of the forest

Under the existing conditions in Romania, making this result operational involves a larger range of policy makers, such as MWFEP, MAF and the Romanian Parliament. From this point of view, the importance of this effect was correctly assessed, proving the realistic approach of the TOPP method, especially because in the near future we might expect changes in the balance between state and private property, favoring the latter.

In order to achieve these results, several activities are required in the following areas:

- Forest harvesting principles;
- Ownership patterns.

It is necessary to:

- **observe the forest harvesting principles, according to the forestry code.** As initial conditions, the *wood cutting volume has to be correlated with the growth ratio* and, on the other hand, *monitor forest harvesting* in order to *optimize the profit/ecological effect ratio*.

  Control of wood cutting on sloping land as well as afforestation of excessively degraded lands might represent a start for ecological reconstruction. Moreover, it is planned to set up an efficient training system for private owners.

  For this activity, the following important projects have been identified:

  Existing/On-going Project

  - Afforestation of Copsa Mica area

Planned Projects

- Development and extension of forestry ecosystem monitoring
- Control soil erosion in Tazlau river basin

Proposed Project

- Identification of degraded pastures.

- **achieve stability of the ownership patterns.** Establishment and stability of ownership involves also some responsibilities, otherwise easy to conjure away; therefore to ***complete the issue of ownership titles*** is a strong need, as well as the ***setup of land market***.

  Promote fiscal facilities for landowners could be a solution for convincing them to restrain themselves from obtaining immediate economic advantages but with disastrous ecological consequences.

  For this activity, the following important projects have been identified:

  Proposed Projects

  - Inventory of degraded areas resulting from irrational forest harvesting
  - Soil erosion control measures in Subcarpathian areas
  - Issuing the laws regulating the land market.

(iv) Implementation of ecological farming practices and appropriate management of the hydro-technical works

The Danube Delta, as a Biosphere Reserve, has its own legislation for guiding the local activities. Despite that, the influences from outside the biome, as well as the already existing ones and consolidated in time, require both special non-structural and structural interventions for its ecological reconstruction.

In order to achieve these results, several activities are required in the following areas:

- Stable hydrological regime upstream and in the Danube Delta
- Ecological restoration
- Ecological ways of resources use.

It is necessary to:

- **reach a balanced hydrological regime in the Danube Delta & upstream.** It is necessary that in a while, the embanked areas go back to their natural state. This is valid also for all the artificial channels that induced negative effects; that is practically meaning to ***reduce the arable land*** and ***close some artificial channels***.

  It is necessary as well to ***calibrate some channels*** and to unsilt some lakes and channels in the Danube Delta.

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - Consolidation of the sea shore line of the Danube Delta Biosphere Reserve
  - Improvement of ecological conditions for water circulation in the complex Matita – Merhei in the Danube Delta Biosphere Reserve
  - Unsilting and calibration of Sontea, Radacinasi, Perivolovca, Litcov channels in the Danube Delta Biosphere Reserve

Planned Projects

- Reclamation technologies of agricultural soils affected by oil and salted water pollution in tributary basin : Black Sea
- Development of ecological database using GIS (Romanian Danube river basin)
- Inventory of flooding areas

Proposed Projects

- Bathimetric and streams study in the Danube Delta
- Identification and calibration of artificial channels that modified the hydrological regime in the Danube Delta Biosphere Reserve
- Ecological reconstruction through measures regulating the hydrological regime of the Danube Delta
- Impact study regarding the influence of seacoast dykes upon natural ecosystem in the Danube Delta.

➢ **use the resources in the Danube Delta in an ecological way.** A basic element is to *forbid the use of pesticides* and establish limits for fertilizers.

Reconstruct ecologically the areas affected by embankments in the Danube Delta and complete the list of species protected by the law are good enough premises for recovery. In the same time, it is advisable to perform traditional farming for satisfying local needs, and to develop agro-tourism as well.

For this activity, the following projects have been identified:

Existing/On-going Projects

- Adequate management of reed resources in the Danube Delta Biosphere Reserve
- Protection and maintenance of species populations highly valuable in the Danube Delta Biosphere Reserve
- Identification maintenance and protection of spawning areas for different fish species in the Danube Delta Biosphere Reserve

Planned Projects

- Protected areas monitoring in the Danube Delta Biosphere Reserve
- Improvement of environmental quality monitoring in the Danube Delta Biosphere Reserve, integrated in the national system
- Promotion of traditional farming in the framework of sustainable development
- Identification of the sources polluting Danube waters in the Danube Delta Biosphere Reserve

Proposed Projects

- Identification of some areas from agricultural polders for ecological reconstruction in the Danube Delta Biosphere Reserve
- Study on efficient agro-tourism performance in the Danube Delta Biosphere Reserve
- Rehabilitation of traditional areas for willow species in the Danube Delta Biosphere Reserve
- Elaboration and implementation of strategies for ecological reconstruction in fishing polders in the Danube Delta Biosphere Reserve
- Analysis of opportunities for extending prohibition periods for endangered fish species.

- **manage in an appropriate way the hydro-technical works that produce negative effects.** It is extremely difficult to intervene immediately with strong structural measures, because in time, some ecosystems developed as such.

  It is recommended to implement non-structural measures in order to reduce the present negative effects and improve the operation of hydro-technical works. Only the hydro-technical works producing extremely serious negative effects will be dismantled.

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - Management objective for bio-diversity conservation and sustainable development in the Danube Delta Biosphere Reserve
  - Setup of a management system for sustainable use in the Danube Delta Biosphere Reserve
  - Development and improvement of monitoring systems of tourist activity in the Danube Delta Biosphere Reserve

  Planned Projects

  - Research on the dynamics and functioning of the natural ecosystem in the Danube Delta Biosphere Reserve
  - Identification of lake areas and undisturbed fishery basins in the Danube Delta Biosphere Reserve
  - Development of cooperation with international bodies for implementation of the objectives in the management plan of the Danube Delta Biosphere Reserve

  Proposed Projects

  - Develop basic hydraulic model of the Delta which simulates observed changes in water levels and flood areas
  - Study on identification and implementation of non–structural measures in the Danube Delta
  - Study regarding the effects produced by the hydro-technical works in the Danube Delta.

3.1.4. Important Assumptions for the Sector

Important assumptions are external factors which are important for the success of the program but lies outside its scope and not under the direct control of the program. These external factors may affect the implementation and long-term sustainability of the program. The important assumptions or external factors must be taken into consideration if the objectives defined at (the next) higher levels are to be achieved.

At the **activity** level, the following assumptions have been identified:

- **Sufficient budgetary resources provided**

  Practically, for the identified activities it is essential to provide the necessary financial resources. If the public national budget must bear the harshness and pressures of the transition period, it is very unlikely to be able to face on its own such needs. Therefore domestic and foreign investors should be counted in, because on privatization or purchase of animal farms, some investments in the wastewater treatment plants might be expected. A second support source might be international grants and loans with governmental participation and guarantees, of course.

- **Actual use of modern wastewater treatment technologies**

  Use of modern technologies is a basic condition in achieving the proposed goal. The low efficiency or reliability of the technologies and equipment presently in use, added to non-performant investments lead to cease and even regression of polluting phenomena, but not at their diminishment.

- **Sufficient financial resources for training provided**

  As an immediate non-structural measure, training is able to ensure something very expensive and valuable with minimum of investment. Identification and good management of these funds may become a major advantage in reconsidering the pollution phenomenon in Romania.

- **Ecological land policy in Danube Delta applied**

  Introduction of an ecological land policy in the protected areas provide appropriate conditions for some activities for the benefit of the local population only, they have the obligation to comply with all the other juridical provisions. Even if the Danube Delta is a less-favored area, applying measures of a coherent land and water policy, it is very likely to obtain favorable economic and ecological results.

- **Public awareness achieved**

  Making public aware of the importance of resources and bio-diversity protection is a sine-qua-non condition for success in such an approach. An important role is here to play by non-governmental organizations (over 20,000 presently), which, irrespectively of their specific goals, having - many of them - strong affiliation to environmental or related issues.

- **Monitoring implementation ensured**

  Monitoring at such a large scale cannot be efficient any more in absence of a central supervision, control and intervention system. The more operative the interventions are, the more pollution is limited (in terms of quantity and quality) and the reconstruction is more accessible. Automatic and computerized equipment is a safe operational solution. The real possibility to use GIS should not be neglected at all, involving the Romanian Center for Use of Teledetection in Agriculture, a recently created unit, but with wide perspectives.

For this sector at the **results/output** level the following assumption have been identified:

- **Further implementation of correct agricultural policies already established**

  Implementing already established agricultural policies might have undesirable results if it is not correctly done. Each implementation level should preserve the core and the spirit of the regulations without intervening and distorting them. Some solutions should be found for receiving rejections and interventions that are distorting the objective and the expected result.

- **Sufficient funds for updating wastewater treatment plants provided**

  This is a very important assumption, but it is still depending on the transition period, whose priorities are permanently changing. The comments are the same with those expressed at the first assumption, but still taking into account the context not exactly favorable.

- **Optimal profit/ecological balance ratio achieved**

  This assumption is ambitious enough to be not correctly assessed. In principle, it is about finding the optimal economic - ecological ratio (eco-eco). This ratio is depending on the local environmental resources and factors, as well as on the sense and the economic power of the phenomenon. An another important criterion is the period of time for achievement. If in other areas we might afford a 10-12 years compliance plan, in the Danube Delta this optimization has to be achieved immediately, even facing the risk of under-evaluation for the time being.

3.1.5. Impact Indicators for Sector Results

Impact Indicators were developed for sector objectives and sector results. They define the contents of the objectives and results in operationally measurable terms (quantity, quality, target groups, partner institutions, time period and place). They should give an adequate picture of the situation. Furthermore, they should be measurable in a consistent way at an acceptable cost.

The following impact indicators were identified for the results/outputs:

For the result 1.1:

- **Reduction of nutrients in water by efficient appliance of adequate agricultural practices in accordance with E.U. standards, thus increasing agricultural production by 10% till 2003 in the Danube flood areas**

  The indicator is a global one ("nutrients") and is measuring the reduction of nutrients coming from fertilizers, in 2003, as compared to 1998, while increasing the agricultural production in the mentioned areas by 10%. In other words, this surplus will not result from increasing the fertilizers doses per hectare, but from modern cropping technologies, including an increase of natural or synthesized fertilizers efficiency (controlled remanence or losses in the soil). This indicator is expressing in the same time the regeneration capacity of the soil ecosystem. This indicator allows to precise the objective and the results. Explain how this indicator facilitate the measurement of the success of the results and objectives and how to use this indicator, how to get data and information)

For the result 1.2:

- **Reduction of water eutrophication in 30% of the surface waters adjacent to farms, including the Prut river, downstream "COMTOM" discharge, until 2001**

  This indicator is in fact a bio-indicator and is measuring the reduction of eutrophication phenomenon caused by the organically loaded waters, while preserving the present production levels. This means practically an assessment of the efficiency of intervention in the technological production and operation processes of the wastewater treatment plants, different from those used in the reference year (1998).

For the result 1.3:

- **Reduction of soil erosion in forest areas by 50%, thus extending the yearly afforested area by 10% up to 2008 in comparison with 1998**

  This indicator is a global physical one (wind and hydraulic erosion) and is assessing the effect of some relevant measures in forest harvesting. A 10% increase of the yearly-afforested areas on degraded lands until 2008 as compared to 1998 is responding both to a vital need, but to stop the erosion phenomenon also.

For result 1.4:

- **Extension of ecologically reconstructed area by 10000 ha while preserving the traditional activities, up to 2001, in the Danube Delta biosphere reserve**

  This is an ecological physic indicator, measuring the regeneration capability of the Danube Delta biome, together with an anthropic activity in this sense (anthropically supported). Certain opposition is expected, both anthropic and natural as well. This indicative parameter, as any of the above mentioned might be developed with other thresholds or significance.

3.2. Industry Waste Management

3.2.1. Situation Analysis

3.2.1.1. Importance of the Sector and Activities Leading to Water Pollution and Environmental Degradation

Introduction

The problems facing Romanian industrial sector today find their roots in the past excessively centralized government with its directed production and investments plans, allocation of inputs, and administered and highly distorted prices. Romania had a non-competitive economy, no experience in economic reform, and insufficient regulations and institutions needed for a market economy. This situation resulted in increased rigidity in the transition process and in substantial economic and social losses.

In 1990 a strategy of transition was adopted, which combined carefully paced reform process in state enterprises with a phased approach to price liberalization, in a balanced effort to keep inflationary pressures under control and to stop the decline in production and the displacement of labor, as well as to abate the living costs. In this respect, measures were adopted aimed at removing the command economy, passing the privatization law, encouraging foreign investment etc**.**

Today, the development agenda of Romania includes *systematic reform, macroeconomic structural adjustment and macro-stabilization.* The program of structural adjustment complements the Government' socio-economic systematic reform program in the macroeconomic areas.

Recent changes on environment and economy

The policy of self-sufficiency at any cost adopted by Romania from the early 1980s exacerbated inefficiencies throughout the economy. The entire transition process started when the central government began promulgating several legal and institutional reforms.

First, private property was recognized (Privatization legislation passed since 1991) and the consumer was allowed to have sovereignty on issues of residential location. The private sector's contribution to GDP was estimated at 16% in 1990, 26% in 1992, 32% in 1993 and 39% in 1995.

Second, decentralization laws gave the local governments authority to manage their own problems.

Third, the local finance laws officially shifted the burden of financing of most local services to local governments. Since 1990, when the free market formally replaced the centrally planned economic system, specific elements, required to restructure the whole economy, began to materialize especially those related to economic activities. However, the destruction of the equilibrium of the centralized planned economy led to a rapid decline in industrial output.

The changes of the last two years contributed to the end of the economic decline. These changes mainly refer to:

- The transfer of the State planning and resource allocation prerogatives to the newly independent commercial companies as the main managers of the economy;
- The recent legislation covering fields such as privatization and environment, and the restructuring of different economic sectors including industry;
- The new established free market relations between the commercial companies.

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

The policies for the sector

Romania is rich in natural resources: oil (in 1938 it was the second biggest producer in Europe and the seventh in the world), methane gas (the fifth biggest world producer in 1975), coal, nonferrous ores, gold, silver, salt etc. The major industrial branches are machine building, food industry, metallurgy, chemistry, light industry, wood processing. The country's railway network totals 11,374 km of which 3,866 km electrified track. The public road network totals 72,828 km of which 17,248 modernized roads.

The diversity of three perspectives: economic, socio-cultural, and environmental needs and concerns suggests that there is no universally "right" or "wrong" policy path to achieve environmentally sustainable development in the Romania as in any other country in the Danube river basin.

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

Sector industrial policies have been set up together with program of rationalization of the production system and investments in the new macroeconomic environment. The introduction of policies that force producers to compete in open markets leads to restructuring away from heavy industries and towards less polluting lighter industries and services. Favorable impacts on the environment come from price liberalization and removal of subsidies, privatization, competitive markets, reform of taxation, interest and exchange rates.

Policies and strategies in the area of water pollution

The measures taken by Romania for the sustainable improvements for human health protection include the treatment of the drinking water as an essential element of the integrated water resources and quality management as components of the wide environmental policy. Water resources in Romania are administered according to the principles of *integrated water management* which links water quality and water quantity, ground water and surface water, together with the environmental and economic considerations.

Policies on water quality protection take account of wider pollution control, water resources management and health and social planning. These elements are well integrated in the Romanian water resources management strategy. The Romanian legislation framework reflects the need to manage all the natural resources as part of an integrated strategy, which involve cooperation of all the relevant governmental agencies.

The impacts of the policy changes can be seen in the down-sizing of operations in a number of enterprises and outright closures for reasons of unacceptably high inefficiencies, low competitiveness and pollution impacts. It is therefore imperative that prices of energy, other industrial inputs, water, forestry and other natural resources be maintained at economic levels. Besides the removal of subsidies, the elimination of barriers to both domestic and foreign trade plays an important role in attaining and maintaining input prices to their economic levels.

Priority problems identified in the field of environmental protection are approached in a unified manner in the *Environmental Protection Strategy of Romania* developed by the Ministry of Water, Forests and Environmental Protection. The Romanian government recognizes the challenges involved in implementing economic instruments aimed at addressing the environmental problems.

The Ministry of Waters, Forests and the Environment approved the Environmental Action Program in accordance with the LUCERNE model. The program provides the guidelines for the targeted national strategies and the policy actions of greatest benefits in the short and the long run.

Duties and responsibilities of the stakeholders

Several stakeholders can have significant impact on the design, operation of enforcement program related to the prevention and control of pollution provided by the industry. Enforcement in Romania involves many different groups, including government agencies, citizens groups and non-government organizations, and industry, being both the regulated body and the polluter. A key element in the environmental strategy of the country is defining the roles and responsibilities of the various groups involved or affected by the water pollution.

The role of the organizations is specific:

1. legislative organizations: the Ministry of Water, Forest and Environmental Protection, Ministry of Health and the Ministry of Industry and Trade;
2. executive organization: Environmental Protection Agency and Regia Autonoma Apele Romane that have their own role in the internal mechanisms for enforcing administrative orders and appealing agency actions, including also the natural resource management agencies responsible for energy, minerals, forests, that belong to various ministries, or
3. (iii) judicial organizations responsible for interpreting both the Environmental Protection Law and Water Law.

At the governmental level, the Water Department part of the Ministry of Water, Forests, and Environmental Protection (MAPPM) regulates the water sector. The Water Department supervises *Apele Române* (AR), a public utility with branches in each of the country's 12 river basins. AR is responsible for the management of 70,000 kilometers of rivers and 150 multi-purpose lakes and dikes. AR supplies 95% of the raw water to municipalities, industry, and agriculture. *Local government* is responsible for municipal water supply and wastewater treatment. For enforcement, the Water Department of MAPPM and AR can take legal action against non-complying facilities and levy fines and other sanctions — including closure — against violators. Compliance is monitored in many ways. *First,* AR conducts routine plant sampling and inspections, including the review of the facility's records (enterprises are responsible for monitoring and reporting their discharges). While the number of inspections is planned, the timing of the visit is not known to the enterprise. *Second,* AR carries out unplanned plant visits, usually based on concerns raised from other inspections. *Third,* when an accident is reported, AR does an immediate inspection. *Finally,* through its ambient program, AR also conducts periodic sampling from a series of sampling checkpoints along water bodies, both selectively for pollution-prone water bodies and according to predefined annual programs. *Local environmental protection agencies* also carry out some limited water monitoring. The key person in all water management is ***the actual consumer***. The present organization of the Romanian water sector does not reflect this fully, as the water resources management and provision of raw water are separated from the actual provision of water and wastewater services, the latter being under the responsibility of the Municipalities and the Ministry of Public Works. The present Romanian approach is splitting the water resources management from the raw water provision and the actual water services provision.

*The role of non-governmental organization*s has a major impact on the environmental program success and efficiency. The Romanian government enforcement programs benefit by working with these groups. Several private organizations include in Romania industrial association, professional and technical societies, trade union and workers' councils, universities, insurance companies.

The regulator (Environmental Protection Agency, Regia Autonoma Apele Romane or Ministry of Water, Forest and Environmental Protection) works together with the *industry*, the potential and existing polluter, to create a new professional philosophy.

Finally, the *citizens* play a major role in shaping and implementing the environmental and water programs, through specific lobbying effects. The Ministry of Water, Forest and Environmental Protection developed the mechanisms of having access to the water management information held by water authorities.

The main activities, contributing to water pollution in the sector

Economic growth and human development activities have resulted in an increasing deterioration of water quality to the extent that they pose serious threats to health in many parts of the country.

In many localities, in the urban and especially in the rural area in Romania, contamination of surface and ground water used for abstraction was mainly produced by the lack of appropriate *methods for the transport, treatment and disposal of liquid and solid wastes* coming from industrial activities. The most important polluting industries are: ore mining activities; chemical and petrochemical industries; pulp and paper; metal works and machinery; food industry; textile industry. The tailing deposits generate particularly serious problems to the environment due to both the risk they create as regards the stability of the settling ponds and to the direct adverse impact on the soil (land occupation, soil degradation), water (surface and underground water pollution) and air. There are no incineration facilities for pesticides, medicine drugs or for other expired chemical products. Chemical pollution coming from specific industries that still dump their wastes on land and water represents a major concern for Romania.

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

In the river basins most of the pollution are coming from landfills related to the following operations: mining deposits of sterile and sludge from mining activities; deposits of lime sludge from inorganic chemical industry; organic chemical industry with their deposits of organic solid residuals; deposits of pulp coming from paper production or deposits of fly ash and sludge from the energy production. 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).

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

From the total number of the industrial waste disposal sites 30% are located inside the urban localities, having and an important landscape adverse impact. At the same time, there are 56 disposal sites, without any specific facilities, located on the riverbanks. Only 23% from the industrial disposal sites have environmental license. Industrial discharges, leachate from abandoned waste dumps and waste transport systems all contribute to the load of toxic micro-pollutants reaching the Black Sea from the Danube and its tributaries.

The industrial disposal sites are special arranged for the certain kinds of waste as: ashes and slag from the power plants, chemical and petrochemical wastes, dump heaps from mining fields, etc. In the mixed waste disposal sites are accepted both domestic and industrial residues (excepting those toxic or dangerous) including, usually, sludge from the wastewater treatment plants, wastes coming from construction, wood waste, etc. The liquid wastes are disposed in the wastewater treatment plants that are generally performing only physical/chemical steps. Most of the large industrial units have their *own disposal plants*, both for liquid and solids wastes. This situation facilitates the identification of the waste source and the development of the imposed pollution prevention measures.

Reducing the industrial discharges and eliminating the diffuse sources of pollution during solid and liquid transport activities is a major 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. Moreover, the shortage of adequate liquid and solid waste disposal measures in many rural areas impairs the well being and quality of life for many people in Romania.

Concluding, the most important problems coming from industrial activities affecting the health of Danube River ecosystems and water users in Romania are considered to be:

1. inappropriate liquid and solid wastes regimes;
2. inadequate industrial waste treatment procedures, and
3. solid wastes from industrial activities being improperly disposed.

Therefore, the key relationship between these three activities leading to water pollution has been considered to be **industrial waste management**.

3.2.1.2. Current Strengths/Assets

The goal of achieving prevention and control of pollution due to the industrial waste management set the priorities for identifying necessary policy and regulations reforms. The strategic directions to be approached are mainly influenced by the current strengths and assets. Government, industry and the public must rely on these assets and strengths to be able to cooperate for the implementation of actions, which meets the goal.

Concerning **inappropriate transport of liquid and solid wastes** the following assets have been identified:

- **Environmental legislation**

  Having the framework Environmental Law no. 137/1995, the Water Law 107/1996, and several other regulations including a recent proposal on self-financing of EPA, Romania is at a crossroad in its efforts to create an environmental sustainable development and market economy. This legal framework will facilitate the use of several policy instruments, including environmental permits and licenses, user charges for the treatment and disposal of industrial wastewater and solid wastes, pollution charges, subsidies, legal environmental liabilities and other appropriate economic instruments for solid and liquid waste.

  Effective waste management policy assumes development of a comprehensive medium to long-term policies and priorities. The strategy will be based on four principles: direct reduction of waste sources; optimization of environmentally sound treatment and disposal according to the EU standards; reduction of movement of waste; ability increased to the waste producer.

- **Standards**

  Largely local councils handle liquid and solid wastes generated by industry, but the government also carry out certain functions, including the setting of standards for disposal and charges to be applied. Water pollution prevention and control may be deliberately factored into the strategies and policies of Water Department and/or enforced through environmental standards imposed by local environment protection agency or by the water authority itself.

  The purpose of the existing Romanian existing standards (ambient water quality) is to protect the public health and welfare, and enhance the water quality compatible with the specified water uses. Such standards relate to total loads and concentrations of pollutants for inputs entering the system (especially from industry), as well as to effluents discharged to the environment. There are no standards for the use, movement and disposal of hazardous waste and no design criteria for disposal facilities.

  Moreover, there are also no standards for field sampling procedures, handling of samples, or analytical procedures. The management of water quality in relation to industrial wastewater treatment and disposal may thus be achieved through a combination of environmental regulations and standards. Outright bans may be imposed on the discharge of some substances, such as intractable waste, to the sewerage system.

- **Unleaking and protected transport network**

  The necessity to prevent water pollution and contamination through the transport system has been accepted by industry and there is an inducement for discharges to improve the quality of waste, reduce the quantities of waste discharged to the sewerage system, impose control measures to secure the leachate through enforcement actions. The levels of the charges have been increased over time to create a stronger economic incentive effect.

- **Existing monitoring system**

  The water quality monitoring in Romania has been initiated since 1954, but it started to be systematically performed beginning in the mid 70's when first methodological aspects, specific to this domain had been also elaborated. Monitoring system is an essential part of the water resources management in Romania. The Ministry of Water, Forest and Environmental Protection has a nationwide monitoring system comprising 275 slow monthly and 65 fast daily monitoring stations for surface water; 55 seasonal monitoring for lakes and 280 seasonal monitoring stations for ground water. To induce industries to change their behavior, the Ministry strengthened the monitoring and enforcement capacity of the local branches and imposed industry to self-monitor their emissions. There is shortage of equipment and staff.

- **Ecological training**

  The achievement of the desired balance between development and human needs and the environment implies the *change in a fundamental way of the attitude and policy* regarding the water management and environment. The most important principle which were suggested to be taken into consideration related to public awareness in the making decision process include: the existence of public involvement and participation, a strong flow of information between all the interested implied and the need for a high degree of public education.

  Environmental NGOs have launched education and monitoring campaigns that have raised public awareness on environmental issues. There is a need to raise public awareness in the field of environment and economic instruments. Pollution is sometimes underestimated due to the inadequate reporting system. Only little information is available on the benefits of pollution prevention measures or on the comparative efficiency and effectiveness for wastewater and solid waste management approaches.

Environmental groups in Romania are generally in favor of sustainable water use approach, and the community has supported the principle of saving and protecting water.

The tremendous effect of inappropriate disposal measures of the wastes on the tourism activities in the country has been considered at the need assessment to consolidate the ecological awareness of the population through group training and campaigns organized by local environmental organizations. Moreover the industry responds to calls for permanent environmental education and qualification of personnel involved in wastewater treatment plants, organizing training programs. Finally, all training programs require follow-up and monitoring of trainees and supervisors to assessment effectiveness and to supplement and redesign curriculum.

- **Performant "clean" technologies**

  In the first instance, reduction of wastewater and solid wastes implies also measures of prevention. The modern dual approach to prevention is proposed: the introduction of new clean technologies and the development of appropriate products.

  The primary purpose of developing clean technologies in this context is to use non-polluting manufacturing processes, which generate a minimum of waste. Minimizing waste at the product level means taking into account the environmental impact of the entire product life cycle. Consumers also need to be informed about the ecological characteristics of products and packaging by appropriate labeling.

  The objectives of the existing environmental protection policy are to raise awareness and share experiences about the effectiveness of waste minimization, many elements of which involve cleaner production practices. In addition to treatment alternatives, the effort should be increased for: identifying future alternatives to conventional chemicals and more efficient processes to reduce water consumption and energy use; developing guidelines on waste minimization and efficient water and energy use; preparing lists of environmental friendly and harmful dye chemicals and auxiliaries and to initiate waste minimization pilot projects.

  The main objective of the new liquid and solid waste legislation is to give low-waste technologies priorities over conventional waste disposal. The second objective is to provide the future framework for an acceptable waste disposal. Developing low-waste technologies in order to find new solutions for the residues use instead of their disposal. This includes re-use of the residues as raw materials in other production process and substituting those substances, which create the waste problem.

In addition to ecological training and performant "clean" technologies, for **inadequate industrial wastewater treatment** the following strengths have been considered:

- **Control equipment**

  Control equipment is required for ensuring proper operation and maintenance of wastewater treatment plants. There is a considerable need for ensuring control equipment available in time.

- **Studies, analysis, technical assistance**

  The lack of management of solid and liquid waste is due partly to the fragmentation of responsibility for identify, designating, and managing. Clearly there is a nee to develop a unified and structured approach through studies and analysis to the integrated waste management and pollution prevention control measures. Due to the growing shortage of available landfill capacity, inadequate enforcement procedures, and rising disposal costs, illegal dumping of both hazardous and non-hazardous wastes is increasing (implying potential additional health costs from groundwater pollution). Modern management and operation techniques are required at nearly all levels. The *technical assistance* provided so far was needed not only to perform a specific pre or feasibility study or environmental audit, but also to impart maximum of skills and know-how.

- **Existence of foreign investors, willing to invest in wastewater treatment plants**

  The budget deficit is to be brought under control as the money supply and thus the inflation. The favored instrument of the government has been to improve the permit system with environmental abatement investment co-financing to stimulate pollution sources to meet permit requirements. If in 1994 the national treasury provided the majority of financing, in 1997 the budget's share of investments fell to 45 per cent of all investments.

  Specific environmental investments financing is provided from: central and local government budgets for public utility works, water users' own funds, development funds of the start-run autonomous agencies (Apele Romane); funds resulting from loans. The works of public utility include water treatment units, waste disposal sites, filtering station, etc. Economic agents use state budget, credits or their own funds to develop or modernize cleaner technologies or to build wastewater treatment plants or other emission purification units. In spite of dedicated efforts by the government through its austerity budgets and by the donors to provide investment, the reduced allocation of the funds is obstructing the creation of environmentally sustainable development in Romania.

- **Valuation opportunities**

  Effluent volumes and quality may be affected by the pricing policies that are applied to inputs to the sewerage system. Pricing policies for discharges of waste can affect the volumes and quantities of wastes carried by the sewerage system. Other prices to be taken into account include charges for sewerage services and for reclaimed saleable products such as effluent and treated sludge. The effectiveness of recycling programs will depend strongly on the pricing regimes that are implemented. Responsibility for proposing a series of new economic instruments and *valuation procedures* to assist the water and waste management has been delegated to the environmental and river basin water authorities. Such instruments are consistent with the provisions of the new legislation, which is based on the "polluter-pays" and "beneficiary-pays principal".

Regarding **insufficient management of solid wastes**, besides environmental legislation, standards, ecological training and performant "clean" technologies, the following assets have been identified:

- **Monitoring the influence upon environmental factors**

  In Romania, solid waste services represent a critical part of maintaining a high level of urban and rural environmental quality. The importance of this issue is related to a successful transition to a market economy and democratic society. It is mainly due to the: important role of the solid waste services on the quality of life and their importance as a production input; significant impact of the solid waste services on the quality of the environment; the linkage between the health and welfare of a household in a rural or urban area and the efficient provision of these solid waste services; the tremendous effect on the tourism activities in the country.

  The large quantities of industrial and domestic wastes are producing serious adverse impact on the environmental factors. Due to the reduction of the economic activities after 1990, only about 268 million tons of wastes were produced in 1994, which represent with 98 millions tons less than in 1992. Out of the total quantity of waste, 260 million tons are industrial waste, while about 8 tons are domestic waste.

  Uncollected industrial waste threatens public health and impedes surface drainage. Supplementary, the presence of hazardous wastes has longer-term consequences for the morbidity and mortality of human as well as for the regional flora and fauna. The waste monitoring system is lacking in many respects and needs to be improved. Emissions monitoring equipment should be made available to the worst polluting firms. The equipment would enable the enterprises to improve its self-monitoring capability as part of its upgraded operation and maintenance program

- **Existence of recycling centers**

  An important element in water pollution prevention strategy is *reuse and recycling.* Once waste has been created, the best way of preventing or reducing adverse effects on the environment is to reuse or recycle it. This can take a variety of forms including regeneration, raw materials recovery, and energy conversion.

  The government tailors charges and regulations to reduce the bulk of material generated and to encourage recycling. The existing system is considered to be equitable, and also encourage waste minimization and recycling by both private and public centers. The second options of current waste disposal is represented in a small proportion by incineration, sorting and recycling of some raw materials (paper, plastics, steel, cast iron, lead, aluminum, copper and other metals), recovery of some metals (nickel, chromium, gold, silver) by using specific technologies.

  This process was recorded only concerning industrial wastes, municipalities were not yet concern for waste re-use and recycling, their activities being oriented only for the waste collection and definitive disposal. In 1994, the re-use of waste is only partially achieved, to an extent of about 22-23% of the total. The main types of waste which have been recovered in 1994 to a larger extent were: wooden waste - 99%, crap iron - 75%, cooper and alloy waste - 87%; lead waste - 74%; tin and alloy waste - 65 %; glass - 74%; paper and cardboard - 71%; used oils - 55,3%. Comparing with 1995, in 1997 there is an increase in reuse of wastes with 1.47 mil. tons, meaning about 2.67%.

- **Construction behavior survey**

  To ensure that all wastes which cannot be recycled are disposed of without endangering the environment two type of actions are needed: These are first, high standards and, second, self-sufficiency. In the first place, national-wide standards of treatments and disposal are essential. These will range from plant construction and operation procedures to the obligation to perform post-closure caution in the case of landfill sites. The alternative for a better infrastructure for waste disposal is one, which is self-sufficient at the national level. Liquid and solid waste treatment capacity is, however, far from being adequate. It is required *to establish a network of disposal facilities* to meet standards and to minimize movement of waste and to provide a reliable and quality service.

- **Mass media**

  There are information policies to improve public acceptance for the sustainable use of water resources and water quality protection. In the past, consultation with the public has been very limited in the government decision process. For the last seven years, the largest driving force behind public participation in Romania, which was identified by legal experts and observers, is the media. The media is becoming increasingly attentive towards the water quality protection measures. According to existing experiences, the environmental and water management authorities are aware of the benefits of public participation and generally include public participation in their decision-making even beyond the legal requirements. As an example, the Ministry of Water, Forest and Environmental Protection, through its Water Department developed in the Water Law and its regulation the participation plans conditions. These include: having an appropriate legislative framework, a local capacity to carry out the consultation, which means wide distribution of information before consultation begins, public notice and comment, adequate resources to organize public hearing, provision of feed-back on results of consultation process and social science expertise. The effectiveness of this system will be evaluated very soon, when the first River Basin Committees for three pilots will start operating.

- **Control equipment**

  Control equipment is required for ensuring proper operation and maintenance of solid waste deposits. There is a considerable need for ensuring control equipment available in time.

3.2.1.3. Analysis of Transboundary Effects

The transboundary effects play an important role, especially for the downstream countries, as it is Romania. In the European context, taking into consideration the geographical position, it might be concluded that Romania is the *main final receiver* (by the Danube River Delta and the Black Sea territorial waters) of pollutants coming from the Danube River riparian countries taking up also the main part of its own pollution impact.

Untreated or partly treated wastewater from industry pose constant risk to Romania as a downstream water user. Moreover the performance of most treatment facilities in Romania is far below design specification due to inadequate capacity and lack of maintenance, shortage of spare parts and equipment. For example, the quality of both Somes and Cris rivers is influenced by the existing pollution sources located in its Romanian basin including its tributaries, and also from some of transboundary sources situated in Hungary.

The main loads on the Somes River Basin resulting from the Romanian activities are heavy metals. To this load other riparian countries activity impact is added and the total load is reflected downstream on the Danube River entering Romanian territory. Monitoring and alarming systems are the first step in solving the problems, but these actions will not solve the problems of transboundary pollution with its effects.

The quality of the Mures is influenced by the existing pollution sources located in its Romanian basin including its tributaries and also from a few numbers of transboundary sources situated in Hungary. The Prut River, which collects water from Ukraine, Moldavia and Romania, is the last major tributary of the Danube that has a significant impact on both the Danube Delta and the Black Sea.

The quality of the Prut is influenced by the existing pollution sources located on its tributaries, Jijia and Bahlui, and also from a number of transboundary sources, such as Iaremcha, Kolomyia and Chernivtsi. The influence on the water quality of Prut is due to the presence of heavy metals from Ukrainian sources. The increases at Chemivitsi and Tarasivtsi indicate that there are heavy metals in the effluent from Chemivitsi wastewater treatment plant and additionally from the downstream discharges, which may be from sewer overflows or from industries. The 13 electroplating factories in Chemivitsi are likely source of heavy metals and agricultural processing and canning plants are a possible source of zinc, copper and nickel. Much of the nitrate and phosphate load is probably derived from agricultural run-off, but some may also come from wastewater treatment plants from Romanian and Moldavia.

The following transboundary effects have been considered:

- **Water use affected by accidents**

  Taking into account the large number of accidental pollution events which produced many water supply interruptions and environmental and health effects, the prevention and control of accidental pollution and hazardous phenomena represent a major priority for Romania.

  Industry is responsible for most of the direct and indirect discharges of hazardous substances into the Danube or its tributaries. By accidents or due to natural causes (earthquakes, land slides), the effluent might contain heavy metals, organic micro pollutants or oil products and solvents. Shipping on Danube is the permanent chronic source of accidental oil pollution in particular through the illegal dumping of used oil and tank washing water. Accidental pollution occurred also as a result of transport and storage of oil in old and inadequately maintained pipelines and tanks.

- **Effect on biodiversity**

  The presence of hazardous wastes has longer-term consequences for the morbidity and mortality of human as well as for the regional flora and fauna. The tailing deposits generate particularly serious problems to the environment due to both the risk they create as regards the stability of the settling ponds and to the direct adverse impact on the soil (land occupation, soil degradation), water (surface and ground water pollution). Due to the of growing shortage of available landfill capacity, inadequate enforcement procedures, and rising disposal costs, illegal dumping of both hazardous and non-hazardous wastes is increasing (implying potential additional health costs from groundwater pollution). The predominant method of solid waste disposal consists of *landfills*, without any technological standard imposed by those in force in EU. In spite of the broad variety of landscape and efforts to protect the habitats, the rich biodiversity of Danube river basin on the Romanian territory is suffering: many species are endangered or are already threatened, with extinction.

- **Deterioration of ecological equilibrium**

  A major problem is represented by the water pollution generated by the *waste disposal sites:* some are located inside the urban localities, having an important landscape adverse impact. Many disposal sites, without any specific facilities, located on the riverbanks produce acute pollution of receiving bodies. Industry is responsible of most of the direct and indirect discharges inadequately treated that contribute to the deterioration of the whole equilibrium of the ecosystem.

- **Pollution of environmental factors**

  Liquid and solid waste services represent a critical part of maintaining a high level of urban and rural environmental and water quality; the large quantities of industrial wastes are producing serious adverse impact on the whole environmental factors. A particular spill of pollutants into rivers and lakes can cause cumulative changes in the water quality that can produce serious damages to ecosystems and high economic losses caused by pollution.

- **Deterioration of water quality due to repeated discharges**

  Uncollected industrial waste threatens public health and impedes surface drainage. Most of these locations represent simply empty sites (natural or resulted from previous human activities), do not have specific environmental protection measures against pollution and deposit both industrial and domestic wastes. Moreover, there is no separation or treatment of these categories of wastes, only in few sites the wastes are dumped according to their origin: municipal, industrial and mixed. The consequences of untreated or partly treated wastewater from industry pose constant risk to human and environmental health. Moreover the performance of most treatment facilities in Romania is far below design specification due to inadequate capacity and lack of maintenance, shortage of spare parts

3.2.2. Sector Problem Analysis

3.2.2.1. Core Problem

The following core problem have been identified for this sector:

“SIGNIFFICANT POLLUTION FROM INDUSTRY”

Industry is one of the major contributors to the environmental degradation in Romania. Given the wide range of processes- particularly those related to the wastewater being inadequately discharged or to improper solid waste disposal, the core problem of the industrial sector is represented by significant pollution from industry. A substantial share of environmental health hazard and degradation of the aquatic ecosystem are due to the significant pollution from the industry.

3.2.2.2. Causes Leading to Environmental Problems

In many localities, in the urban and especially in the rural area in Romania, contamination of surface and ground water used for abstraction was mainly produced by the lack of appropriate methods for the disposal of liquid and solid wastes from industrial activities. The link between population and health hazards is related to inadequate water treatment and supply processes, including improper and ineffective operations and in many cases, total absence of treatment.

The following direct causes of the sector core problem have been identified:

- Inadequate transport of solid and liquid waste
- Discharge of wastewaters
- Inadequate management of solid waste

These problems have other direct causes. An explanation of each of these problems together with their cause-effect relation will be given below:

(i) Inadequate transport of solid and liquid waste

a. Low reliability of the transport system

A significant contribution to the industrial pollution is provided by the existing inadequately maintained network of pipelines and tanks, an **old and obsolete distribution network**, having large quantities of losses, due to the lack of financing sources for ensuring maintenance and the development of the sewerage system and rehabilitation of the existing one. Moreover, **the disrespect and ignorance of modern constructing technologies** contributed to an inadequate transport of solid and liquid waste. Furthermore, the structure of the tariffs for the services needs to be revised as to include all costs incurred.

b. Unqualified maintenance staff

Most of the personnel working as **operators in the wastewater treatment plant are not able to use modern technologies or techniques** due to the lack of training and specialization. The need to permanently update the knowledge of the operators is very important factor. The greatest need is for staff on the ground and priority is given to wastewater treatment plants operators and solid waste deposit personnel.

c. Natural causes

During and after producing natural causes, like landslides or earthquakes the reliability of the transport system is affected and an inadequate transport of the solid and liquid wastes is taking place.

(ii) Discharge of wastewaters

a. Discharge of insufficiently treated wastewaters

Treatment ranges from primary treatment to secondary treatment. Although past investments in industrial waste management treatment plants have been substantial, they have been less effective than they could have been in terms of overall pollution reduction. The **deficiency of performant & clean technologies & equipment** is due to the insufficient local technical and economic expertise and lack of funds to transfer know how and modern clean technology. The impossibility of the economic unit, due to both financial and **legislative constraints**, to realize pre-treatment contributes also to the increase of insufficiently discharge of treated wastewater. At the wastewater treatment

plant, the **personnel is not sufficiently qualified**, the rules of operation of the plant are not mandatory. The **monitoring system does not function**, the self-monitoring does not exist, the public is not adequately involved and the **capacity of the plant is not correlated to the needs**. Rehabilitation of existing plants is not possible, as the funds are not available.

b. Discharge of untreated wastewaters

For some parts of the country the discharge into the aquatic environment is realized without any waste treatment. The country' socio-economic largest population centers continue to discharge their wastes untreated. This is due to the **missing funds and legal framework to construct wastewater treatment plants**.

(iii) Inadequate management of solid waste

a. Inadequate waste treatment

Inadequate waste treatment is due to inadequate treatment technologies deriving from inadequate design because of insufficient funds for ecological conservation of industrial units. Another cause for inadequate waste treatment is disrespect of legislation originating from inappropriate implementation and insufficient control.

In addition to the both above mentioned causes, it is noticed the low level of staff qualification generated from insufficient training which is deriving form inappropriate management of human resources.

Both lack of financial resources and inadequate design project impede the proper solid waste management. The inadequate use of landfills is influencing the solution for creating a sound deposit. Moreover, the lack of both control equipment and modalities to survey the construction behavior represent important causes of water pollution.

b. Inadequate disposal

Inadequate disposal is due to unecological landfills because of inappropriate design. Very important of design weaknesses are the insufficient financial resources. Inadequate disposal is also generated from inappropriate use of landfills, related with shortcomings in monitoring and control system, disrespect of operational regulations and legislation.

For the identification of the landfills, the financing sources and the design of correct techniques to prevent leakage represent major causes to produce water pollution.

3.2.2.3. Environmental Effects

The environmental consequences of inappropriate activities are the following:

a. Pollution of surface and underground waters
b. Soil and subsoil pollution
c. Air pollution

The environmental effects of significant pollution from industry might be quantified for each of the environmental media, including water, soils and subsoil and air. The deterioration of the biodiversity and of the whole ecosystem, the reduction of available water and soil resources impacts the socio-economic development of the country. The *environmental effect of surface and ground water pollution* is reflected first on the **human and environmental health**, leading to producing of **ecological catastrophes**. As a result, the affected **population migrates** to less pollute area. According to the kind of damage, size of damage and urgency needed, **costs of remedial actions and measures** for cleaning-up the pollution areas will be identified and ensured. Concrete revenue instruments need to be proposed and their expected revenues need to be forecasted as well.

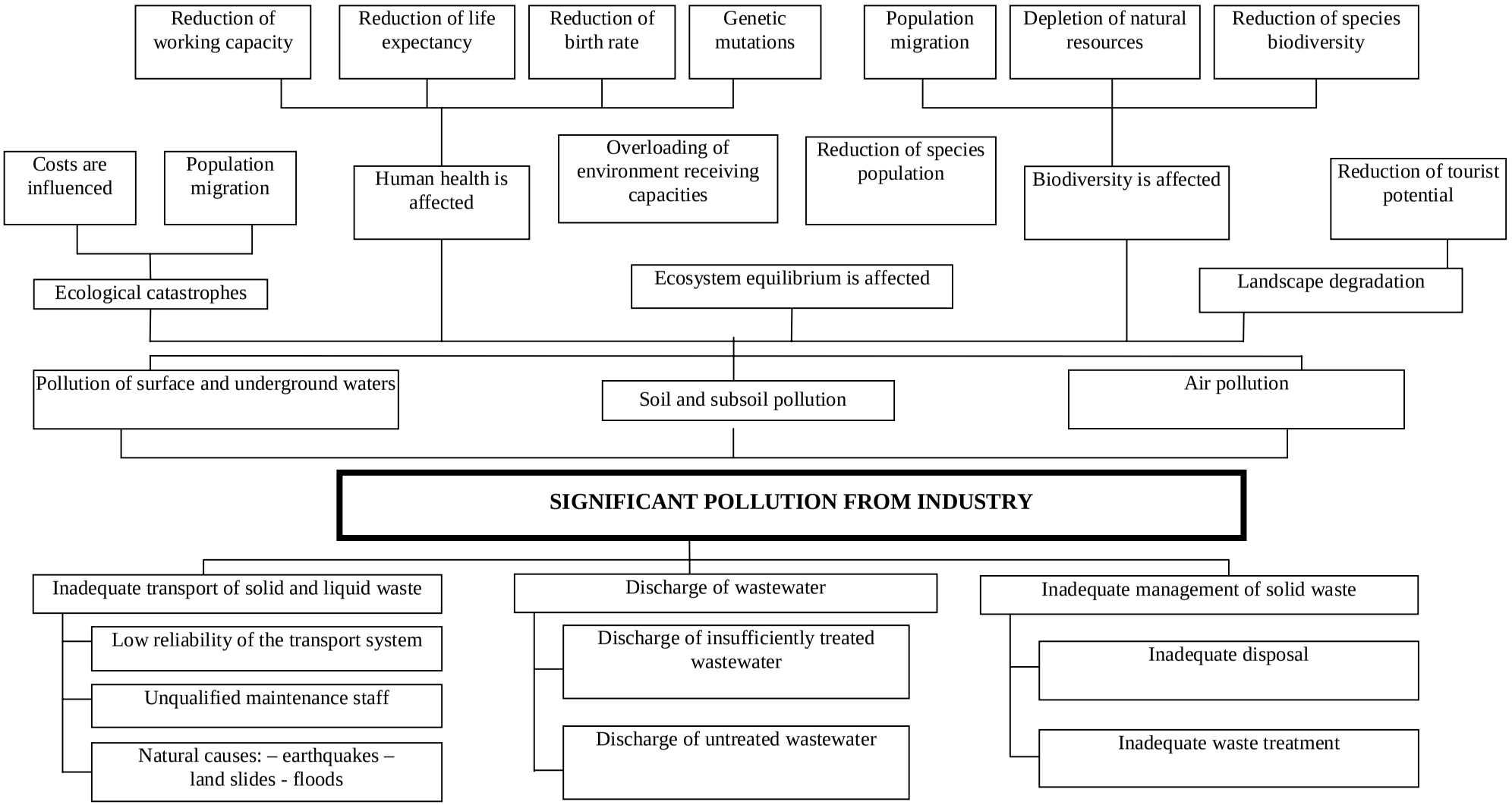
There is a little attention to occupational health. In hazardous environments, **working conditions** are subjecting to be reviewed. These practices continue due, in part, to the lack of knowledge, incentives paid to workers for hazardous occupations, lack of instruments to measure working exposure and lack of proper laws. The consequences are reflected into the **reduction of birth rate**, **reduction of life expectancy**, **genetic changes**, etc.

Industrial units use state budget, credits or their own funds to develop or modernize cleaner technologies or to build wastewater treatment plants or solid waste deposits. In spite of dedicated efforts by the government through its austerity budgets and by the donors to provide investment, the reduced allocation of the funds is obstructing the creation of environmentally sustainable development in Romania. Moreover, the cost of the environmental regulatory system is too high for both the government (for elaborating regulations, standards, and guidelines) and the economic agents (for complying with the legal requirements of the regulations) and this might affect the country's international competitiveness. The Ministry of Water, Forest and Environmental Protection has recently developed a proposal on a new unified vision and prioritized, low-cost strategy on how to achieve the sustainable development of the country by the year 2000.

The *soil and subsoil pollution* reduce the availability of usable soil and subsoil resources and results in very high treatment costs, affect the **ecosystem equilibrium. Overloading of environment receiving capacities**, by decreasing its bearing capacities in terms of natural resources use represents one of the most significant environmental consequences of industrial pollution.

Industrial activities represent the main emitters of air pollution. A serious problem exists in relation to the disposal of industrial wastes into air. The **landscape degradation** and the establishment of a conservative framework, including species inventory, analysis of causes of decline and proposals of strategies to arrest biodiversity decline, design and implementation of a program to ensure recover of the natural resources that influence finally the welfare and the **tourism activities** are hot issues.

PROBLEM HIERARCHY
2. Industrial Waste Management



3.2.3. Objectives, Expected Results, Actions and Related Projects

The following sector objective have been identified as a result of the TOPP methodology as being:

"ACHIEVEMENT OF POLLUTION PREVENTION AND ABATEMENT FOR INDUSTRY"

In order to achieve the sector objective, the following results have to be accomplished

- Implementation of clean technologies
- Ensuring discharge of standard quality treated wastewaters
- Adoption of proper management of solid waste
- Adequate performing of wastes transport

(i) Implementation of clean technologies

This result will have positive effects on both sides: regulated entity and the regulator. First, it will contribute to the improvement of environmental performance of the enterprises for the least cost solutions; will enhance the economic competitiveness on the national and international market. Moreover, the cost of compliance will be reduced for both the local environmental or water authority. The working conditions will be improved, the risk to toxic exposure will be reduced and the benefits in terms of improvement of technical knowledge of the operators are great. By reducing the pollution, the whole aquatic ecosystem will benefit, leading to sustainable development of Romania. The government will provide the legal and economic framework for the use of clean technologies and the use of Best Available Techniques for the pollution control at the source.

In order to achieve this result, several the activities have to be undertaken in the following fields:

- Clean technologies
- BAT
- Losses in existing installations

It is necessary to:

- **introduce the legal and economic framework for implementation of clean technologies**. First, it is required to elaborate on of strategies and policies to promote clean technologies according to the needs of the industry and in compliance to environmental regulations; the government should have the institutional capacity to assist the enterprises in their efforts to identify the benefits of implementing clean technologies.

  It will be also important to promote legal norms according to the EU regulations as a results of a joint proposal of the Ministry of Water, Forest and Environmental Protection and Ministry of Trade and Industry

  Mechanisms to stimulate clean technologies implementation have to be identified for the companies as well for the government. The government should provide necessary information for the enterprises to have access to the best available technologies in the world, to facilitate their choice and guide on the implementation and cost-benefits analysis.

  Moreover, stimulation of companies through economic instruments has to be ensured. Assistance is needed for the enterprises to identify the costs and benefits of implementing clean technologies. The mechanism will include taxes, incentives charges schemes, tariffs for recovering the costs and risk assessment for not complying with environmental regulations.

For this activity, the following projects have been identified:

Planned Projects:

- Introduction of new economic and financial instruments for three media: water, air and solid wastes. The proposals of the economic instruments will include solution for the introduction, use and enforcement of the incentive schemes.
- Legislative harmonization Aquis Communautaire according to the stages imposed by EU. The Ministry of Water, Forest and Environmental Protection is planning updating the existing legislation

Proposed Projects

- Supporting economic operators for ISO 14001 Certification is one of the concern for the government to enhance the environmental determinants performance and the competitiveness of enterprises in relation to trade barriers. It includes several activities: permanent training, ecological awareness on the advantages of implementing Environmental Management System; identifying ways of marketing eco-labeling products, etc.
- Development of institutional framework for implementation as a consequence of the introduction of the legal framework.

- **promote incentives for BAT and multiple financing resources identified.** The creation of an institutional framework to promote and sustain clean technologies**,** is an urgent need for the cleaning-up the polluted areas, for the rehabilitation and modernization of the industrial processes

  In order to promote incentives for BAT, governmental programme has to be elaborated and funds for know-how transfer has to be set up. The success of this issue is depending of the introduction of the new economic instruments.

  In this context measures have to be undertaken to provision financing sources. The Ministry of Water, Forest and Environmental Protection is developing project proposals to be submitted to international organization and donors for future funding.

  It is also required to ensure know-how transfer and control of BAT levels. Several projects will identify and clarify the duties and responsibilities of both the government and the economic units for transferring, controlling and measuring the progress and the pollution reduction resulted by implementing new technologies.

  The Creation of centers to promote clean technologies is a key issue. This element is very important in the actual economic context of the country, based on the implementation of new regulations, compliance schedules and enforcement schemes. The centers will collect information on the technologies, will produce a database and disseminate information; it will also promote and advertise on those enterprises that are selling environmentally friendly technologies.

  For this activity, the following projects have been identified:

  Planned Project

  - Creation of “clean” technologies centers. The centers will promote BAT and low cost measures. The development of the enterprise diagnosis analysis can be also a subject of these centers.
  - These centers will ensure not only the promotion of the clean technologies but also will provide possibilities for permanent training

Proposed Project

- **Network for the "clean" technologies centers**, to ensure the flow of information, progress and transfer and use of successful stories.

- **undertake measures to minimize losses in the existing installations.** To obtain this objective, the **guidelines for wastes minimization solutions have to be elaborated.** The guidelines are needed for the industrial activities containing ways to reduce the amount of waste, to re-use or recycle the wastes, for specific types of industry.

  In this context the availability of human and financial resources is also very important. Both qualified human resources and financial means are needed to ensure the appropriate implementation of the proposed measures.

  It is foreseen to elaborate and implement methods for effects evaluation To ensure further improvements or multiplication of the proposed solutions, the amount of waste being decreased as well as the cost saving should be permanently assessed.

  Database centers with updated information will be created. These centers will have the purposes to fully disseminate information, involve public and serve as a reference source for research or decision making process.

  For this activity, the following projects have been identified:

Existing/On-going Projects

For Romanian *petrochemistry* there are significant changes. The self-assurance demonstrated by the present government coalition in terms of the massive restructuring of this strategic sector of the economy appears to be finally yielding its fruits. It is expected to prove that the modernized petrochemical will become a serious competitor on the domestic and international markets.

Pulp and paper have been manufactured in Romania for a very long time - over 150 years. The sixties and the early seventies brought in a significant development of the sector, mostly with equipment of Western manufacture. This resulted in an increase in the capacity of paper and board production of over 70%. However, since 1980, there has been little progress in keeping the pace with worldwide trends in the pulp and paper industry. The new free market environment has put pressure upon the industry and - as a result of restructuring and conversion actions - a large part of the out-of-date equipment has been shut down. The company continues to improve their pulping capabilities, resources being injected into a number of projects aimed at improving wastepaper processing, decreasing energy consumption and substituting elemental chlorine in bleaching. Mills with modern equipment managed to improve the quality of their bleached packaging papers, newsprint and printing and writing papers. Some of the main achievements include the modernization of specific equipment at plants such as Letea Bacau SA.

- Modernizing the equipment in Letea Bacau
- Modernizing the equipment in Siderca Calarasi
- Modernizing the equipment in Petrobrazi
- Modernizing the equipment in Arpechim

Planned Projects

- Applying more ecological processes in Manper Tg Mures
- Applying more ecological processes in UPS Govora
- Applying more ecological processes in the Technological flow in Sinteza Oradea

(ii) Ensuring discharge of standard quality treated wastewaters

The important elements to achieve the discharge of standard quality waters include the necessity to provide the immediate actions to assess the existing needs for (i) pre-treatment requirements that should be strictly regulated; (ii) for specific treatment procedures at the existing plants: chemical, mechanical, biological; and (iii) new plants in the localities where they are missing.

In order to achieve this result, several the activities are required in the following areas:

- wastewater treatment plants construction
- operation of treatment plants
- wastewater discharges

It is necessary to:

- **promote construction of new WWTP and rehabilitation of existing plants**. This activity will be carried out through technical, economical **and social evaluation of studies, projects and prognoses of development**, for the purpose to establish a realistically picture of the needs and possibilities for construction of new plants or modernization of the existing plants

  The treatment needs for the foreseen wastewater quantity and quality have to be estimated, in terms of treatment procedures according to the effluent standards.

  Criteria for requirements and prioritization have to be set up. In order to ensure a realistic prioritization, the criteria should be established. The development of the list of localities with no wastewater treatment plants, the capacities, etc to facilitate their comparison and technical and economic evaluation for decision.

  The necessary resources have to be estimated. The resources should be identified, assessed and provide in time.

  Furthermore, projects on specific industries will be elaborated to facilitate comparison and multiply the effort by implementing the same solution to other wastewater treatment plant.

  Projects will be also promoted in terms of technical and financial support. Both technical and financial part should be made available for entrepreneurs and donors, respectively. The project proposal will be implemented and the wastewater treatment plant realized, extended, rehabilitated or modernized.

  For this activity, the following projects have been identified:

  Proposed Project

  - **Completion and achievement of all optimum operational parameters of wastewater treatment plants at the economic agents**. A list with the localities that do not have wastewater treatment plants or they are inadequately operating will be developed, analyzed and a decision on the priorities is going to be taken. The projects will be elaborated and then implemented to operate at the optimum operational parameters and according to the legal norms.

- **ensure proper operation of treatment plants**. To carry out this activity, the **operation norms will be elaborated**. Rules of operation of the wastewater treatment plant are needed to ensure proper functioning at the optimum operational parameters

  Measures have to be undertaken to monitor influents and effluents within the treatment process. Monitoring is an essential part of the plant management. Monitoring is carried out to determine the water quality, the efficiency of treatment equipment, compliance with environmental regulations.

The necessary qualified personnel will be provided. There is a considerable need for training the operators and to ensure enough number of them.

It is also planned to mane funds available for maintenance and operation of WWTP. Most of the existing operational difficulties are due to the lack of funds required for proper maintenance and operation of the plant.

In parallel, emergency procedures have to be developed. For the safety reasons but also to facilitate the compliance to the legal norms, the emergency operation procedures should be written for each location of the plants.

For this activity, the following projects have been identified:

Existing/On-going Projects

- Modernizing Colorom Codlea wastewater treatment plant (WWTP)
- Rehabilitation of Antibiotice Iasi WWTP
- Modernization Siderca Calarasi WWTP
- Rehabilitation of Arpechim WWTP
- Rehabilitation of Petrobrazi WWTP

Planned Projects

- Modernization of Celohart Donaris Braila wastewater treatment plant
- Modernization of Cluj-Napoca Clujana WWTP
- Modernization of Vidra Orastie WWTP

Modernization at these plants include actions and measures aiming for improving of the operational parameters, extension of the capacity to the desired capacity, or adding another stage in the treatment process.

- **undertake measures for discharge of properly treated wastewaters**. Firstly, it is foreseen to **ensure application of emergency procedures through providing of emergency means**. For emergency situations, (accidental pollution) the procedures as well the equipment and installations needed for intervention should be ensured

  In this context it is also important to **ensure implementation of inspection program by the authorities** Inspection as a main component of enforcement program is carried out by the water and/or environmental authority, in order to determine the water quality, the efficiency of treatment equipment, compliance with environmental regulations.

  Furthermore, it is planned to implement control program carried out by the operator. Control program ensure the self-monitoring of the operator and it is carried out by the plant operator in collaboration with the water and environmental authority.

  For this activity, the following projects have been identified:

  Proposed Project

  - **Completion and achievement of all optimum operational parameters of wastewater treatment plants at the economic agents**. The projects will be elaborated and then implemented to operate at the optimum operational parameters and according to the legal norms. The rules of operation will establish obligations for the company to monitor the effluents and influents.

(iii) Adoption of proper management of solid waste

Developing and improving wastes collection, treatment and disposal systems represent one of the most important results leading to the reduction of the industrial pollution and improvement of the water quality.

In order to achieve this result, several activities are required in the following areas:

- solid waste treatment
- solid waste disposal

It is necessary to:

- **use adequate processes for solid waste treatment. Introduction of the legislative framework is very important i**n this context. The issuing of waste regulations is an immediate priority for the government and is an important element.

  Afterwards **rules for operation have to be elaboration of.** Rules of operation of the solid waste treatment are needed to ensure proper functioning at the optimum operational parameters.

  It is also required to ensure proper application of treatment through control and inspection.

  Furthermore, the availability financial and human resources for the operation and maintenance of the landfills has to be supported.

  In addition to the above mentioned measures it is necessary to ensure monitoring of treatment technologies in order to control the efficiency of the plants.

  The control and inspection will be also enforced. As part of the enforcement the regulator is in charge with the inspection and monitoring of the treatment procedures, the influents and effluents conditions etc.

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - **Improvement of the toxic waste management Petrotel Lukoil**
  - **Functioning of an incinerator for toxic waste Oltchim Ramnicu Valcea** Decision on the need to adopt of incineration as a disposal method was taken only on the basis of a comprehensive analysis of the costs and benefits.

  Planned Projects

  - **Action program in the oil sector.** A compendia of different situation and solutions to them for the emergency cases.

- **ensure adequate disposal of solid wastes.** The important elements are similar to those mentioned at the above results: Introduce the legislative framework; implementation of related regulation according to the general urban plan; elaboration of methods for solid wastes disposal; make available financial and human resources; ensure monitoring of landfills; ecological education and public participation and enforce control and inspection programs

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  The existing projects contain solutions for improving the solid waste management, by imposing measures to prevent the seepage and contamination of the water quality:

  - Sealing of phosphorus-gypsum pond Fertilchem Navodari
  - Sealing of phosphorus-gypsum pond Sofert Bacau

Planned Projects

- Application of more ecological disposal of sludge and ashes Conel CET
- Application **of more ecological disposal of sludge and ashes Sidex Galati**

Proposed Project(s)

- **Rehabilitation and reintroduction in the economic circuit of the abandoned industrial areas**. The project will include the old tailing deposits from the mining activities.

(iv) Performing adequately wastes transport

A significant contribution to the industrial pollution is provided by the existing inadequately maintained network of pipelines and tanks, an old and obsolete distribution network, having large quantities of losses, due to the lack of financing sources for ensuring maintenance and the development of the sewerage system and rehabilitation of the existing one. Moreover, the disrespect and ignorance of modern constructing technologies contributed to an inadequate transport of solid and liquid waste.

In order to achieve this result, several activities are required in the following areas:

- waste transport system
- staff qualification

It is necessary to:

- **improve reliability of the waste transport system**. To identify the needs in terms of the financial and human resources existing systems have to be evaluated.

  Afterwards, it will be processed together with the methodology of treating the wastes of estimation of requirements and quantities.

  Other measures are planned to ensure the availability of **financial and human resources and to facilitate modernization** of transport system.

  In this context the **rehabilitation costs in the price system will be internalized**. The structure of the tariffs for the services needs to be revised as to include all costs incurred. In order to improve reliability of the waste transport system, measures have to be undertaken to ensure the **monitoring, the control and inspection activities**.

  For this activity, the following projects have been identified:

  Existing/On-going Projects

  - Providing of safe transport of effluent in Verachim Giurgiu
  - Rehabilitation of wastewater transport network in Romplumb
  - Rehabilitation of wastewater transport network in Phoenix
  - Development of self monitoring system

  Planned Projects

  - Construction and modernization of wastewater treatment plant for intaking of solid and liquid wastes from river ships
  - Improvement of hydraulic transport of wastes coming from CET
  - Purification of soil and ground water in Ploiesti

  Proposed Project

  - Rehabilitation of network for hazardous wastes transports.

- **upgrade the qualification level of the staff**. The important elements, (described for other projects as well) are: introduce optimal human resources management; **elaboration and implementation of permanent training/education program and implementation of a mechanisms of incentives for the staff**

  For this activity, the following projects have been identified:

  Proposed Projects

  - Creation of instruction and qualification centers
  - Assistance given to the economic enterprises in order to identify the methods of risk assessment: technical assistance is needed

The **"high priority projects"** are considered to be:

1. Implementation of clean technologies;
2. Introduction and use of economic instruments;
3. Completion and achievement of all wastewater treatment plants

3.2.4. Important Assumptions for the Sector

Important assumptions are external factors which are important for the success of the program but lies outside its scope and not under the direct control of the program. These external factors may affect the implementation and long-term sustainability of the program. The important assumptions or external factors must be taken into consideration if the objectives defined at (the next) higher levels are to be achieved.

At the **activity** level, the following assumptions have been identified:

- **Operation discipline respected**

  The discipline imposed within the process of treatment, but also during transportation has been identified as one of the main important assumption.

  Clean technology is an advantage for industry. This result will have positive effects on both sides: regulated entity and the regulator. First, it will contribute to the improvement of environmental performance of the enterprises for the least cost solutions; will enhance the economic competitiveness on the national and international market. The working conditions will be improved, the risk to toxic exposure will be reduced and the benefits in terms of improvement of technical knowledge of the operators are great.

For this sector at the **results/output** level the following assumption have been identified:

- **Attracting funds from multiple sources available on time**

  Funds earmarked for water quality protection are not sufficient to attract private capital for pollution abatement. Therefore, some major environmental infrastructure projects have not been decided upon and, consequently, foreign capital cannot support them. The financial support, ensured from various sources, is required to be given at the right time, when it is needed.

- **Ecological awareness effectively increased**

  The public should be aware of the environmental and health hazards in their neighborhoods. The mechanism of having access to the environmental information and the procedure for public involvement in the decision process and in permitting should be developed and permanently updated. There is a need for a public awareness program and for structured environment education in schools.

3.2.5. Impact Indicators for Sector Results

Impact Indicators were developed for sector objectives and sector results. They define the contents of the objectives and results in operationally measurable terms (quantity, quality, target groups, partner institutions, time period and place). They should give an adequate picture of the situation. Furthermore, they should be measurable in a consistent way at an acceptable cost.

Impact Indicators for sector objectives have already been presented in chapter 2.3.4. Indicators for sector results are as follows:

For the result 2.1:

- **Reduction by at least 15% of water consumption in the chemical industry while preserving the production level as well as the products quality of 1998, until 2005**

  The indicator refers to the reduction of water consumption in the chemical industry. It will reflect (i) the sustainable water use; (ii) the increase of the re-use rate within the industrial processes; (iii) the elimination of losses during industrial processes and the signal that for the water user, the water price includes the total costs. Information on this indicator can be obtained from the water management permit. The water norms can be calculated, knowing the output production and the amount of water being sold by the raw water supplier: Apele Romane.

For the result 2.2

- **Reduction of heavy metal content in the wastewaters discharged by industrial units, below 0.2 mg/l (Pb), (Zn) 0.5 mg/l, 0.1 mg/l (Cu), while preserving the production level as well as the products quality as they were in 1998, in the Cris River Basin , until 2005**

  The reduction will show the improvement of the water quality. In the structure of the water tariff, the water user pays for the amount of pollutant being discharged; the measurement will give the amount of pollutant being discharged.

For the result 2.3

- **Reduction of Hg impurification of ground waters below 0.01 mg/l if constructing insulated land fills and / or incinerators for toxic waste by Oltchim Rm. Valcea (the Olt River Basin), until 2005**

For the result 2.4

- **Reduction of oil products content in the polluted soils down to the limits allowed by the current enforced regulation, while recovering 30% of affected areas and putting them back into economic use, in the Prahova and Barcau River Basins, until 2007**

  According to the provision of HG 1001/1991 the amount of pollutants discharged into the environment can be estimated.

3.3. Municipal Waste Management

3.3.1. Situation Analysis

3.3.1.1. Importance of the sector and activities leading to water pollution and environmental degradation

The municipal waste management has an important role while considering the causes of pollution in the Danube River basin. Organic substances and nutrients discharged cause the increasing of phyto-plankton concentration and consequently the increment of oxygen deficit in water.

Danube River falls into the 2nd quality category at its entrance in Romania, which means the polluting factors, are originating from the upstream riparian countries.

About half of the population of Romania that is 11 million inhabitants are connected the sewage collection system. The total municipal wastewater flow is estimated to be about 90 m^3/s. It is estimated that about 190000 tones of BOD_5, 21000 tones of N and 6000 tones of P are discharged yearly into Danube River basin. Almost all inland rivers belong to the Danube River basin. Even those which cross the boundary to Hungary or former Yugoslavia are issuing their water in the Romanian part of the Danube River, finally.

The major pollution problems in the Danube River basin are caused by non-ferrous metal industry, chemical industry, pulp and paper industry and extraction (mining) activities. After 1990 due to the reduction of economic activities a downward trend of waste production has been shown. The amount of waste from the mining sector has been decreased with about 3/4 of the quantification estimated in 1989. The transition period of the country determined a drastically decrease of water pollution from the industry, preserving the pollution caused by the population consumption.

The national On-going programs and projects are based on the previsions of the existing environmental protection strategy and the National Environmental Action Programme (NEAP) which has been approved by the Government and NEAP has been put in accordance with the Environmental European Action Programme.

The objectives for reducing water pollution as they are presented in NEAP are:

- Reducing nitrates, organic substances, including pesticides.
- Decreasing the amounts of heavy metals and organic compounds located in the sediments.
- Reducing BOD_5, N and P emission from WWTPs.
- Controlling the “diffuse pollution”.

Regarding surface water pollution it is estimated that the quality of surface water will be improved diminishing by 8-10 percent of the third category and degraded surface water.

3.3.1.2. Current strengths/assets

The activities leading to pollution are inappropriate discharge of wastewater (without treatment) inadequate operation of the existing WWTPs and pre-treatment plants and inadequate solid waste management in the human settlement areas. The strengths/assets, which are to be taken into consideration while the situation analysis is undertaken, are:

- **Existing technical “know-how”**

  Actually only traditional activated sludge process is applied in wastewater treatment in Romania. Sludge is disposed of after stabilization in the digestion tanks on the drying beds without any other treatment before final disposed. There is no tertiary treatment of wastewater in Romania, that is denitrification process or phosphorous removal process applied in the existing WWTPs.

Romanian specialists are not acquainted with denitrification or phosphorous removal unit operations. Besides the advanced wastewater treatment methods, like adsorption on activated carbon, or membrane filtration are not familiar to the designers and consequently they are not applied. Unit operations for eliminating microbiological contamination are not applied at all in the existing WWTPs. That is why providing the "know-how" concerning the advanced treatment of municipal wastewater would be necessary.

- **Available international funds**

  The international funds have been made available mainly for non-structural projects (e.g. pre-feasibility studies, etc.). It must be mentioned that only a few treatment plants have been supported financially from external sources (e.g. Craiova, Bucharest).

- **Public participation**

  Public attitude is quite strange in Romania, probably due to the fact that they had not been asked to participate in the decision making legislative measures, the public is asked to participate in the authorizing process of all economic activities. It seems that their role is increasing. Anyhow there are some cases where public participation blocked some economic activities due to the significant impact on environment (e.g. Suceava, Giurgiu, Fagaras).

- **Opportunities for additional training**

  The operators, especially from the specific local industrial activities are not well trained. That is why the designed efficiency of most of WWTPs (including pre-treatment plants) is not achieved. That is why the training of the operators is necessary. A proper design and a proper construction of a WWTP could not achieve the designed efficiency without a proper operation.

- **Possibilities of supplementary instruction**

  Supplementary instructions should be make available due to the fact that the personnel is moving out, changed, especially during the transition period of time.

3.3.1.3. Analysis of transboundary effects

The following transboundary effects have been considered:

- **Biodiversity degradation in the Danube Delta, the Black Sea with the neighboring countries**

  Water pollution might determine the decrease of aquatic life and diminish the availability of water resources.

- **Eutrophication** may cause deleterious effects in water treatment of downstream users from Hungary for drinking purposes. Accidental pollution must also be taken into consideration.

- **Jeopardizing human health**

  Human health of downstream users is to be endangered in the case of accidental pollution. For the time being there is not an established system to alarm and to take the necessary practical measures to eliminate the danger of injuring the population downstream the point of accidental pollution.

  To alarm people is not an action to solve definitely the problem, but to take measures to eliminate the hazardous possible effect is an effective way to act.

3.3.2. Sector problem analysis

3.3.2.1. Core problem

The following core problem have been identified with focus on analysis of the water environmental issues in the municipality sector:

"INNEFICIENT MANAGEMENT OF THE WASTEWATER AND SOLID WASTE"

This problem is to be regarded as one of the main components of human activities, which determine negative effects upon the environment. The core problem identified by analyzing the impact of municipal activities on the water environment is taken into consideration while planning projects and policy measures for reduction of water pollution. Solving the core problem means an important contribution for achieving, finally, sustainable social and economic development.

3.3.2.2. Causes leading to environmental problems

To solve the core problem "Inefficient management of the wastewater and solid waste" – the main causes leading to this problem have been considered. Realizing the causes of the core problem a set of proposals has been defined at the workshop. It has been realized that some causes identified are permanent and that is why the planning process should be regarded to be dynamic. Maintaining the sound water environmental conditions will never go to the end.

The following direct causes of the sector care problem have been identified:

- Insufficient wastewater management;
- Inefficient pre-treatment of toxic and specific waters;
- Inadequate solid waste management.

(i) Insufficient wastewater management

Two main aspects of insufficient wastewater management have been put into evidence:

- **Lack of support programmes** for developing individual collection system non existence of coherent programme for waste management in the individual households made the population, especially in the rural area, to apply technical solutions by random, without taking care of health safety conditions (location, the impact on groundwater quality etc.).
- **Insufficient ecological and civic education** caused the indifference of decision-makers. The apathetic attitude of public caused also the missing of a coherent system of measures to improve the sanitary conditions of individual households.

Insufficient wastewater management is related with:

a. Direct discharge of wastewater into the emissaries (outlets) to economic production sectors and consequently to urban areas.

- **Lack of wastewater treatment plants.**

  Galati, Braila, Bucharest cities have been exemplified. Generally, the human settlements located alongside Danube River are not provided with WWTPs. The causes why the WWTPs from some localities are missed is itemized below:

  - **Inappropriate legislation** (lax allowable limits at the discharging points, considering the dilution factors, ignorance of impacts on aquatic life as a limiting issue etc.);

- **Lack of appropriate financial and accounting mechanisms**, caused mainly by the centralized economic system (bureaucracy, approvals of central authorities necessary for investments etc.).
- **Non – reliability of funding**

➢ **Overloaded of some sewerage networks and WWTPs as well.**

Here the main causes are:

- **Inappropriate planning of needs**. Initially the sewage systems (collection and treatment) had been designed taking into consideration a certain development, which had been changed during the time; population migration from the rural to urban areas determined the existing systems to be overloaded. Craiova, Timisoara, Deva and other cities have been exemplified.
- **Inappropriate distribution of funds**. In most of the cases the funds were distributed according to the economic importance of the respective county and not according to the size of impact on environment, including the transboundary aspect.
- **Natural disasters**. Earthquakes, floods and landslides occur in Romania. Due to the fact that sewage collection systems are "hidden works", pipes and other means have been deteriorated. The leakage is not properly controlled and the rainwater comes into the sewage systems overloading hydraulically WWTPs.

➢ **Inadequate individual sewage system**

It has been pointed out that about fifty percent of the populations of Romania are not connected to the centralized sewage systems, which means that they used the individual systems. About ten million people live in the rural area, which is not managed as regards wastewater disposal. It has been considered that the individual sewage systems are inadequate. These systems are made by random, putting in danger the human health mainly by using polluted groundwater for drinking purposes.

This situation have been caused, mainly by:

- Insufficient involvement of responsible bodies, especially the former decision-makers who used to give priority to economic production sectors and consequently to urban areas.
- Lack of support programmes for developing individual collection system non existence of coherent programme for waste management in the individual households made the population, especially in the rural area, to technical solutions by random, without taking care of health safety conditions (location, the impact on groundwater quality etc.).
- Insufficient ecological and civic education caused the indifference of decision-makers. The apathetic attitude of public caused also the missing of a coherent system of measures to improve the sanitary conditions of individual households.

b. Malfunction of wastewater treatment plants

This aspect has been considered as a second sub-cause of insufficient wastewater management and the following explanations have been put into evidence: *the emissaries (outlets)*. This aspect has been considered as a sub-cause of insufficient wastewater management and the following explanations have been put into evidence:

➢ **Inadequate construction of sewerage systems**

It has been considered that there are some WWTPs, which have not reached their planned efficiency due to the construction errors, especially due to the fact that the constructors disrespected the existing standards and norms. In some cases the

constructors were accepted easily to change cheaper materials and equipment but which did not correspond to the quality required. In some cases they made errors in placing the constructions on wrong levels, and they were not enough verified. Caransebes, Gherla, Otelul Rosu and other municipal WWTPs have been exemplified.

- **Inadequate use of sewerage systems**

  The main explanations of why sewerage systems (wastewater collection and WWTP) are not adequately used are intermixed below:

  - **Outdated equipment and inappropriate technologies**. The existing equipment is obsolete and even the equipment, which had been provided did not corresponded to the nowadays requirements. The local authorities, designers and the stakeholders were not allowed to import preferment equipment, but use only that, that was produced in Romania. On the other hand in some cases (e.g. Filiasi, Jidvei, a.s.o.) the treatment technologies chosen had not taken into consideration the fact that skilled operators were not available. Instead of using more simple unit operations for wastewater treatment (e.g. biological filtration), more complicated technologies (that required more skilled personnel) were provided (contact – stabilization, or other advanced chemical treatment).

    Lack of funds has been considered to is another reason to be taken into account to explain the application of outdated equipment and inappropriate technologies.
  - **Lack of information and data for proper operation**. During the time when the WWTPs had been designed the engineers and all the other persons involved in the designing process had not enough information on BATs, the operation instruction were not completed. The operators changed their working places and the instructions for operation were last. Privatization of companies created confuse situations, the former companies have been restructured, the operation personnel has gone to pension, or removed, or dismissed some original designs have been disappeared etc. The laboratory equipment is poor, in some cases does not exist at all (e.g. WWTP of Filiasi), and the operators are not able to control the processes within the WWTPs.
  - **Inexistence of control and measurement system between steps at the final effluent**. Mainly to the lack of funds, the WWTPs are poorly equipped with the measurement facilities. In fact, the measurements of dissolved oxygen, temperature, pH, flow and other parameters are not transmitted automatically in almost all WWTPs in Romania. Due to the poorly skilled staff the scarily automatic measurements equipment is not very well used and the parameters determined by lab analysis are not interpreted in the right way to take decisions on the operation processes (e.g. activated sludge recirculation ratio, oxygen input into the activated sludge tanks etc.).

    And finally, one can say that the staff is poorly skilled due to insufficient training. There is no unitary system to train all the operators to understand the unit operations involved in the treatment technology, namely chemical, biological and physical processes. They are specialized in a narrow corridor of knowledge. A mechanical operator does not understand the language of a biologist, or a chemist or an economist or the other way round. That is why insufficient training has been considered one of the causes for poorly skilled staff and further for inexistence of control and measurement system as well as for inadequate maintenance of sewerage.

- **Inadequate maintenance of sewerage systems**. The main causes of poor operation and maintenance are poorly skilled staff due to the insufficient training. And these issues have been discussed using examples like Campulung, Ocna Mures, Deva, Iasi WWTPs.

(ii) Inefficient pre-treatment of toxic and specific waters

This subcause which determines inefficient management of the municipal wastewater and solid waste regards the local industries and other activities which use the municipal services to dispose off their wastewater. The inefficient pre-treatment of toxic or other specific waters discharged in the public sewerage make the municipal WWTP to work in improper conditions and finally to pollute the emissaries (rivers and groundwater). There are three main causes identified to contribute to the inefficiency of pre-treatment of wastewater discharged upstream the municipal WWTPs:

a. Outdated equipment and inappropriate or old technologies.

It has been considered that there are three main aspects, which contributed to this drawback:

- **Incorrect construction of some objects** in the specific internal sewerage system. The obligation to procure equipment produced only in Romania, and less attention given to wastewater treatment before discharging into the public network gave the result of inefficiency of pre-treatment plants.
- **Lack of information** regarding new performant necessary equipment determined to approach the issue of wastewater pre-treatment in a limited way.
- **Lack of funds** hindered the titleholders to invest in their wastewater pre-treatment plants. The production problems had priority in their view.

b. Unfavorable conditions

Here the following aspects have been considered:

- **Lack of measurement and control systems** between the steps of treatment technology applied. The same explanations given for this issue while discussing about municipal WWTPs is valid also for the pre-treatment of wastewater.
- **Insufficient civic and ecological education**. People have not been learned about the consequences of bad efficiencies of wastewater pre-treatment and the apathic public behavior contributed to the unfavorable conditions to achieve the right efficiency of pre-treatment plants.
- **Low level of the staff knowledge** caused by insufficient training of the operators have also been considered to be a explanation of why the pre-treatment plants do not work inefficiently. For instance, in metal plating companies the operators have had no knowledge about the oxidation reduction or precipitation processes involved to get rid of cyanides, chromium, nickel or other metals. Consequently these metals going to the municipal wastewater hindered the biological processes in the municipal WWTPs.

c. Inappropriate legislation

There were some norms regarding the quality required for the wastewater to be discharged into the public sewage collection system. But these norms were not too specific. For example, the maximum allowable concentration for petroleum products or specific toxic compounds is not mentioned. Nowadays NTPA 002 provides the maximum allowable concentrations of all substances, which might create difficulties in the public sewage systems.

(iii) Inadequate management of solid waste

Here, the inadequate legislation, inappropriate management of landfills and low level of public participation has been identified as causes of inadequate management of solid waste.

a. Inadequate legal financing conditions

In fact, the legislation within the framework of solid waste management had many gaps with missing standards and norms regarding the final disposal of solid waste. Nowadays there are some legal acts referring to solid waste disposal, but one can say that the domestic legislation in this aspect is in On-going process. Insufficient funds caused by inadequate financial mechanisms has been also identified as a motive of inadequate legislation due to the fact that this problem has not been considered as a priority in the decision making process.

b. Inappropriate management of land fills

Except 7 small incineration plants (5 tones of solid waste per hour), the only process applied is land fill over the whole country. The main causes leading to inappropriate management of landfills are itemized below:

- **Insufficient involvement of responsible bodies due to the following reasons:**

  Using non-trained staff. Generally one can say that this type of work is not appreciated and most of the people working in this field of activity are low level educated ones.

  Insufficient inspection. One of the reasons/why the inspectors are not insistent with their activity is the fact that everyone realizes that the technical solution adopted for municipal solid waste disposal was not fully environmentally sound and the change cannot be achieved overnight. That is why the only thing, which is in undergoing process, is to inspect whether the so-called “Compliance Programme” is respected by the responsible companies. On the other hand, lack of interest of the staff is also a cause of insufficient inspection. The staff realizes that they cannot do anything to solve the technical solution overnight and they are not so well paid for their job.

- **Inappropriate equipment for solid waste treatment.**

  As it is shown in the previous paragraph the landfill is the only way of treatment of solid waste in the country. Even this simple method is not properly provided with equipment and the existing one are not properly operated. There is no drainage system provided and groundwater around the solid waste deposits is seriously affected.

- **Lack of spaces for garbage collection.**

  It has been considered that in most of the cases the available access roads are not properly designed for the tracks caring the garbage. On the other hand, increased consumption determines more quantities of garbage coming out from the individual households and the originally designed areas are insufficient.

- **Inadequate disposal of hazardous waste.**

  It has been agreed that hazardous solid waste (battery, mercury lamps etc.) are not adequately disposed off due to the fact that the selective collection of garbage is not practiced in Romania. That is why the hazardous waste is often disposed off in the some place with the domestic garbage.

c. Low level of public participation

It has been considered that public attitude is still apathic with the inadequate solid waste management. There is not enough actions made to set up public awareness on specific problem raised by solid waste collection and disposal.

Communication with mass media is also poor and seems to have insignificant effects.

3.3.2.3. Environmental effects

It has been concluded that water environment is deteriorated due to the causes mentioned above. The environment is injured at the national and transboundary context as well. This is leading to the reduction of economic potential of water resources and finally to the lowering of the living standard. The environmental consequences of inappropriate activities are the following:

- **Microbiological contamination of surface and underground waters**

  It has been agreed that nowadays there is a poor control of micro-organisms in wastewater discharged into emissaries. Micro-organisms are responsible for diseases such as typhoid or cholera, tastes and odors in water supplies, corrosion of concrete and metal structures and prolific microbial growths, which can lead to detrimental quality in lake waters. Inadequate wastewater management and inefficient pre-treatment may lead to microbiological contamination and a few examples have been given: Sebes – Alba, Alexandria and Danube River Delta where some population had been injured by dysentery and cholera. Inadequate individual wastewater disposals (sometimes latrines located upstream individual wells) put in danger the individual water consumers. Although there have not cases of diseases caused by microbiological contamination from landfills, one cannot help telling the danger does not exist.

  Recreation function of the lakes and rivers are drastically reduced putting in danger the population (e.g. Bucharest).

- **Pollution caused by toxic substances**

  It has been considered that the main toxic substances, which affect water environment in Romania, are heavy metals (Pb, Cd, Hg, Zn) cyanides and pesticides. Heavy metals are discharged into the river due to inadequate pre-treatment of specific waters coming from the local industries, which use public sewage collection. The existing/or non-existing municipal WWTPs do not eliminate heavy metals and cyanides by the traditional unit operations applied. Some deleterious effects on groundwater and surface waters appear to be around the landfills where the domestic solid waste is not disposed in a proper way (selective collection and insulation of deposits); that is why heavy metals, including mercury coming from batteries or mercury lamps are going to natural waters.

  Pesticides come from diffuse pollution of agricultural sector, which is discussed in chapter 3.1.

- **Nutrient pollution**

  Nitrogen and Phosphorous as nutrients coming from population create serious problem in lakes and very slow moving waters. In many river abstraction schemes for water supply, row water is stored in reservoirs prior to treatment. Even quite low nutrient contents in the water can result in prolific alga growths giving water much more difficult to treat than original river water.

  It has been realized that in Romania there is not tertiary treatment to remove phosphorous or nitrogen in any municipal WWTP.

- **Landscape degradation**

  Mainly this effect is caused by solid waste landfill, from wastewater pre-treatment plants and finally from inefficient management of the wastewater. River Jiu, river Dambovita downstream Bucharest, river Bega, downstream Timisoara have been given as examples.

In conclusion all the effects described above determine the following effects:

- Contamination of water supplies – additional load on treatment plants;
- Restriction of recreational use;
- Effect on fish life;
- Creation of nuisances – appearance and odor;
- Hindrance to navigation by banks of deposited solids

PROBLEM HIERARCHY
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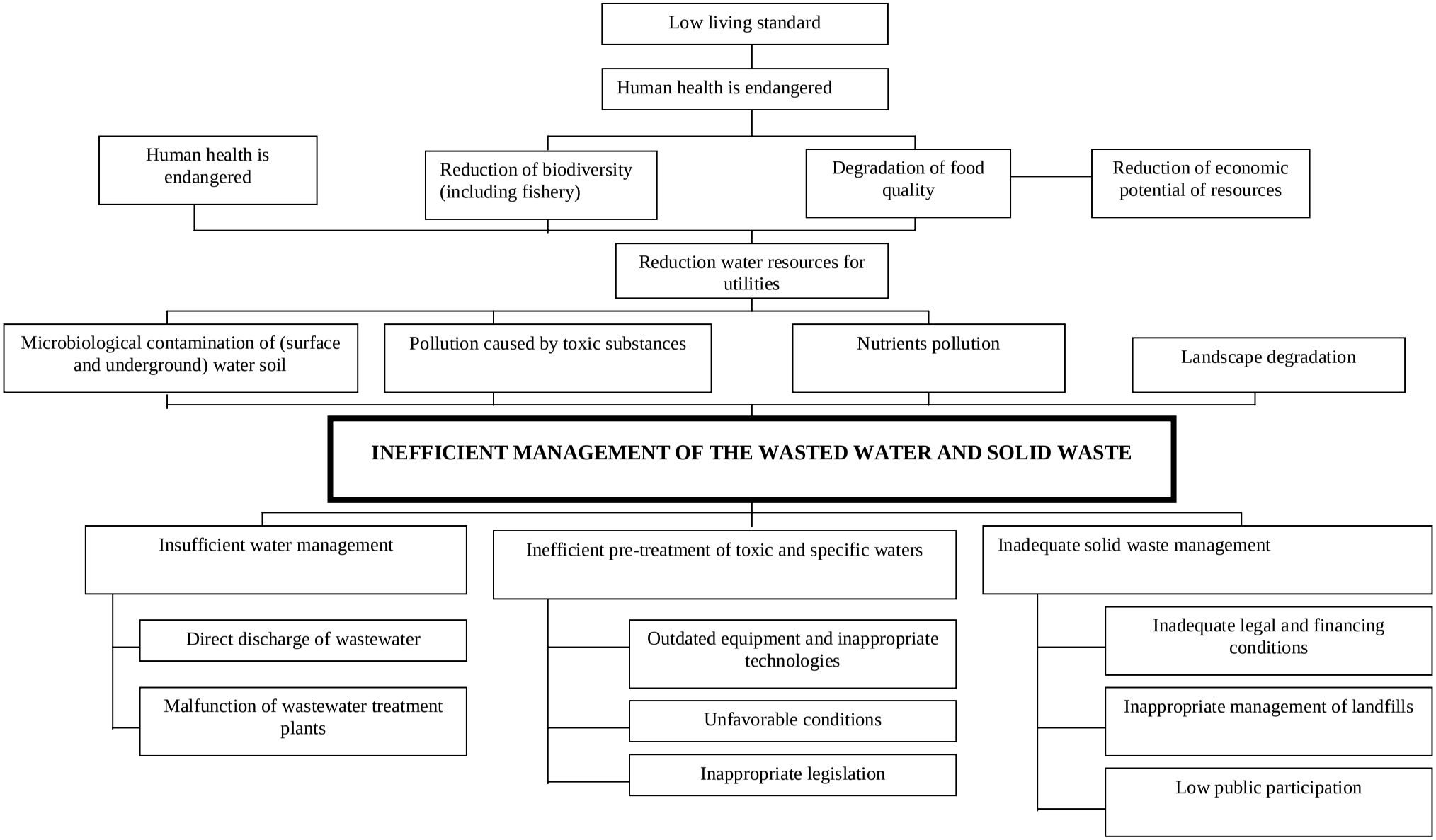


3.3.3. Objectives, Expected Results, Actions and Related Projects

The objective has been established taking into consideration the Core Problem that is to be solved by taking actions and by implementation of some projects. The following sector objective has been identified:

"MANAGEMENT OF WASTEWATER AND SOLID WASTE IMPROVED"

The objective defined is one of the main objectives to be reached in order to reduce or eliminate water pollution and to ensure sustainable social and economic development of the region. In order to achieve the sector objective the following results have to be accomplished:

- Adoption of adequate management of wastewater;
- Performing of pre-treatment of toxic and specific waters;
- Implementation of proper management of solid waster.

(i) Adoption of adequate management of wastewater

The importance of this result consists of a serious alleviation of river pollution and of making available for use of lager quantities of water resources. The importance of this result should be regarded also in the transboundary context.

In order to achieve this result, several activities have to be undertaken in the following fields:

- Direct discharges;
- Existing treatment plants;
- Individual wastewater treatment.

The necessary activities to achieve the result are to:

- **eliminate direct discharge.** Firstly, it is important to:
  - determine through pre-feasibility studies the opportunity to invest in construction of new WWTPs. The pre-feasibility studies will establish the best sound economically technical solution as well as the costs involved comparing with the resulted benefits.
  - set up the technical norms to design and operate WWTPs. In fact, it is necessary to update the existing norms and to put these norms in accordance with the new technical achievements in the last years.
  - develop and apply more efficient (tertiary) treatment methods for specific types of polluters. Here the know-how of new technologies for phosphorous removal or for denitrification is to be provided.

  Furthermore, measures have to be undertaken to:
  - elaborate of new laws and implementation of legislation; approximation of legislation with EU requirements. The EU Directives should be taken into consideration (80/68 EEC, 93/680 EEC, 91/22 EEC etc.).
  - create and use warning system in case of accidents. This element regards effective and concrete system to avoid injuries of water users downstream. This system does not exist at present time. This element is very important also for the transboundary rivers and groundwater.

  It is also necessary to:
  - develop and apply procedures for evaluating the risk for various discharges. There are unexpected effects of directed discharges into rivers which are used for drinking or other purposes downstream, and the risks are still not evaluated up to now.

It is also required to:

- harmonize the analysis methods used by laboratories from the treatment plants with those of water management units. Sometimes the methods applied for analysis of water quality parameters are different and the allowable errors for each method might produce confusions in interpretation and consequently wrong decisions are possible.
- organize at national level a system of providing quality in accordance with ISO 9000 – 14000 and its implementation at the units level. This element suppose to act at the national level using reference laboratories which will make the calibration of other territorial labs, certifying their operation.

It is also planned to:

- Improve of the information system for public to have on active participation in the decision making process, and improvement of training and education programs. This element is quite important to ensure the necessary lobby for decision-makers to pay attention on water environment issues and to provide funds for investments in WWTPs.

In addition to above mentioned measures, it is foreseen to:

- Elaborate new projects and provision of financial resources. The non-structural and structural projects are taken in view. External assistance would be valuable in some cases, especially with non-structural projects.
- Provision of (financing) funds from internal and external sources for treatment plants where municipal discharges with transboundary impact are treated. This element is important to achieve in shorter time the objective proposed.
- Ensure the construction and operation of new WWTP. This element is important avoiding the error in construction and put in value the investment made by a good operation of the plant in order to achieve the designed efficiency with the pollutants removal.

For this activity the following projects have been identified:

Existing/On-going Projects

- WWTP of Harsova

  Harsova is a small locality with a few thousand inhabitants and the wastewater is discharged directly into the Danube River. Anyhow the project is not to become a priority due to the fact that the water environment impact is insignificant.

Planned Projects

- WWTP of Braila city

  WWTP of Braila is under designing process. The technical solution consists of traditional activated sludge process of the wastewater coming from less than 100000 inhabitants. By implementing this project organic load of the Danube River will be decreased. The project is included in SAP (1993) on the 5^{th} place in the list of priority.
- WWTP of Cernavoda city

  The project is to solve the treatment of wastewater coming from about 50 thousand inhabitants. The effluent is discharged directly into the Danube River. The project is not included in the short – term project in SAP or NEAP.

Proposed Projects

- WWTP of Galati city

  This project supposes to solve the treatment of wastewater coming from about 300000 inhabitants wastewater is discharged in Siret. The technology of treatment consists of traditional activated sludge process. The project is included in NEAP and SAP lists.
- WWTP of Zalau city

  This project is included in NEAP list of short-term projects. There are less than 100000 inhabitants in the locality; wastewater is discharged directly into SOMES transboundary river. Technology applied: activated sludge process.
- WWTP of Tulcea city

  The project is to solve the wastewater treatment. Now wastewater is discharged directly into the Danube River just upstream the Delta. The project is not included in the high priority list of NEAP.
- Harmonization of Romanian legislation with EU emission norms.

  This non-structural project is intended to limit the charge of natural water resources by pollutants.

- **improve operation for existing treatment plants.** It is required to **set up procedures** to identify malfunctions due to erection errors as well as rehabilitation of the deteriorated parts. This element is important to have a view of what it is wrongly constructed or have been deteriorated during the time in order to make the necessary prepares.

  In this context, it is planned to **extend modernization**, and add unit operations for nutrients or other pollutants removal as it is required. At present, there is no advanced water treatment for nutrients removal in the country, and some situations the nutrients removal is required.

  Furthermore, measures have to be undertaken to **perform procedures** for risk evaluation for the existing treatment plants. There are unexpected effects, which might occur downstream discharging point of WWTPs and is why risk evaluation should be required and to **improve efficiency of plant operation** by providing measurement and control equipment. Due to the lack of measuring and control equipment the operators are not able to take decision to handle some processes (e.g. to modify the recirculation ratio of the activated sludge, are to provide more oxygen in the aeration tanks, etc.). Warning systems in case of accidents have to be created and used. This issue has been discussed in the previous paragraph.

  Moreover, in order to **improve operation for existing treatment plants**, it will be necessary to **upgrade operator skills**. The skill of the operator is very important element to achieve the required efficiency of WWTP. The most cases the efficiency of the WWTP is not reached because the operators do not know how to handle the process.

  Measures have to be undertaken to make available financing, resources for operation using coercive and incentive measures. It was considered that some operators do not realize the responsibility and on the other hand there are not well paid for their work, comparing with the other workers in the economy.

  It is planned to make compatible methods of analysis used by the operators and inspection bodies. Often the operators applied some standards of analysis which leads to less accurate results and they are judged by the inspection bodies using standards for clean water analysis and that is very different results make confusion in interpretation.

  At national level the system for providing quality in accordance with ISO 9000 - 14001 and its implementation at units level will be organized.

For this activity the following projects have been identified:

Existing/On-going Projects

- Extension of the WWTP of Mangalia city

  By implementing this project the organic load of the Black Sea will be diminished. The project is not included in the list of hot spot-municipal high priority. The technology to be applied is based on the activated sludge process.
- Modernization and reequipment of Iasi – WWTP

  This project comprises the provision of new performant equipment for aeration and other devices for sludge treatment. The project is included in SAP in the 18th place. The wastewater coming from about 400000 inhabitants is discharged into the river Prut that is the boundary river (Republic of Moldavia).
- Modernization of Craiova WWTP

  The project will solve the problem of efficiency of the existing plant and is included in the list of priority of SAP and NEAP. The wastewater is discharged into the river Jiu that is degraded river.

Planned Projects

- Modernization and extension of Timisoara WWTP

  This project comprises new equipment and constructions to cover the whole organic load of population of about half million p.e. The project regards the transboundary aspect (wastewater is discharged into Bega channel, which crosses the boundary to the former Yugoslavia.
- Completion of WWTP of Bucharest - Glina.

  The plant is under construction (60 percent achieved). The WWTP is to treat wastewater from about 2 million p.e. The technology applied: activated sludge process. Wastewater is discharged in river Arges - about 30 km upstream the discharging point to Danube River. The project is not included in the short-term project list of NEAP or SAP.
- Setting up of objectives in water quality (identification of standards and objectives).

  This non- structural project comprises the indicators of quality of natural waters according to the provisions of EU directives.
- Pipes for discharges the treatment wastewater from the Black Sea WWTPs.

  This project is not included in any list of project of NEAP or SAP and comprises rearranging of discharging points wastewater into the Black Sea in order to ensure a better dispersion of pollutants.
- Extension of WWTP of Ploiesti city.

  This structural project is not included in any priority list of priority list of NEAP or SAP. The problem to be solved is to revise the existing plant, which treats wastewater coming from about one million p.e. and discharged into Prahova river.

Proposed Projects

- Extension of WWTP of Deva city.

  This structural project is proposed in the new NEAP and comprises the revision of existing plant which has not enough capacity to treat wastewater coming from about 100,000 p.e. The wastewater is discharged into river Mures that can be considered in the transboundary context.

- Extension of Campulung Muscel WWTP.

  This structural project is included in the priority list of NEAP and provides wastewater treatment based on activated sludge process. Wastewater coming from about 60,000 p.e. is discharged after treatment into river Arges upstream Bucharest that used the river water for drinking purposes.
- Extension of Resita WWTP.

  This structural project comprises the construction of new capacity of wastewater treatment based on activated sludge process. Treated water is discharged into the river Timis that is considered a transboundary river.
- Creation of a new system of reference labs.

  The proposal is based on the idea of making a unitary, compatible system of measuring water quality parameters. The reference labs should have also the task of calibration the other territorial labs.
- Development of environmental labs in transboundary areas: Timisoara, Resita, Craiova, Pitesti, Calarasi, Galati, Tulcea, Bacau, Iasi, Suceava, Satu Mare, Oradea, Arad.

  This project was proposed to fulfill the requirements of having a good supervision of wastewater discharged into the transboundary rivers.
- Control and intervention systems for accidental pollution.

  This non-structural project consists of a set of methods to be applied in case of accidental pollution in order to reduce or to eliminate the effects downstream.
- Development programs for local participating democracy.

  This non-structural project comprises a set of measures to be taken to provide incentives for the participation of public in the decision making process.
- Equipment for treatment plant of UPSOM Ocna Mures.

  It seems this project proposed has wrong position in this sector activity belonging to industrial sector. That is way should be excluded from the list of proposals of the municipal waste management sector.

➢ **ensure proper individual wastewater treatment.** In this context it is planed to develop individual treatment systems on the basis of research program. This element is important for achieving a unitary way to solve the individual wastewater treatment in sound health and economic conditions. Fiscal incentives for promotion of individual treatment systems have to be developed and designed. This element has been considered taking into account the limited economic possibilities of individuals to construct proper facilities to treat wastewater.

It is also required to elaborate appropriate programs for introducing adequate individual systems. This element could be described as it follows: elaborate a set of typical projects, which could be adapted easily by each individual household. This will shorten the achievement of the activity goal.

Bodies and authorities will be involved for introducing individual wastewater treatment. The local authorities, especially, should be keen to have a safety, unitary system of individual wastewater treatment. Otherwise these individual system will be continuing to be made by random, putting in danger the population health.

Measures have to be undertaken to raise public awareness through involvement of media regarded of the importance of household wastes. Public awareness will determine the authorities to have a proper attitude with the importance of household wastes.

It is also foreseen to assist population concerned by introducing individual systems. Population should be assisted with their works in constructing the wastewater individual systems. The individuals have the capabilities to construct the individual systems themselves but if they will be not technically assisted it might happened that the systems would not reach the necessary efficiency.

For this activity the following projects have been identified:

Proposed Projects

- Design national programs for raising public awareness
- This non-structural project of set of measures (leaflets, posters, workshops, mass-media means etc.) which could raise public awareness to understand the necessary conditions to ensure the sanitary conditions of individual wastewater treatment.
- National programs for wastewater treatment and disposal in rural area
- This non-structural project is supposed to set up a group of measures to be undertaken for wastewater treatment and disposal of individual households. The rural area comprises households where about 45 percent of the Romanian population are located.
- Develop guidelines on individual means for wastewater treatment and disposal
- This non-structural project comprises a set of technical solution, which could be generalized to be applied for achieving the necessary efficiency of individual wastewater treatment in the sound health and economic conditions.

(ii) Performing of pre-treatment of toxic and specific waters

The importance of this result consists of assurance of proper conditions for municipal WWTPs efficiencies.

In order to achieve this result, several activities have to be undertaken in the following field:

- Construction of new pre-treatment plants;
- Control;
- Framework conditions.

The necessary activities to achieve the result are to:

- **undertake measures for construction of new pre-treatment plants, upgrading (rehabilitation operation) of the existing ones.** It is important to inform about existing situation in order to establish priorities. This element focuses the problem of choosing the main economic companies, which have deleterious effects, by discharging their wastewater into the public sewage collection, on municipal WWTPs.

  Information about the state of the compliance programme has to be provided. This refers to the fact that all titleholders are under the process of compliance of the negotiated planes (with the environmental authorities). And the state of the compliance stage should be known before starting other actions.

  Information on best available techniques, technologies and equipment has to be available as well. There are industrial processes, which require special technologies for wastewater treatment (e.g. surface filtration, reverse osmosis) which are to be known.

  It is required to elaborate feasibility studies to determine necessary investments. The feasibility studies should establish the optimum economic and technical solution to construct the pre-treatment plant. Funds have to be available for pre-treatment wastewater plants. The title holder should be pressed to provide funds to comply with the conditions put by the local environment authority which had given the temporary allowance to work. This legal procedure should be controlled.

  It is necessary to establish solution to obtain on efficient pre-treatment. This element refers to the necessary studies to get the optimal technical solution to accomplish the requirements of NTPA 002 for discharging wastewater into the public sewage collection system. Modern equipment and technologies have to be used for rehabilitation and

modernization of existing pre-treatment plants. This is important due to the fact that the actual technologies and devices are absolute and difficult to operate. That is why the operators do not operate properly the processes of pre-treatment (precipitation of heavy metals, oxidation – reduction processes oil and grease separation etc.). Referring to the erection of the established WWTP after studying the optimal solution for pre-treatment of the specific water to reach the requirements of NTPA 002, pre-treatment plants have to be constructed The supervision of the works to avoid construction errors is necessary.

It is essential to train operational staff in order to fulfil the quality of the effluent discharging into the public sewage collection system. An untrained operator might compromise all efforts made for pre-treatment of wastewater discharging into the public sewage collection system and finally the municipal WWTP.

Moreover, operational regulations have to be elaborated. The operators must have clear and comprehensive regulations of what they have to do. Otherwise they are not able to understand what they have to do, even when they are instructed about the process of waste treatment.

The wastewater recycling would alleviate the efforts (economically and technically) and will diminish the probability of accidental pollution or unexpected load of municipal WWTP. Therefore, it is important to make a study of recycling possibilities.

For this activity the following projects have been identified:

Existing/On-going Projects and Planned Projects

There are not existing/On-going or planned projects for pre-treatment of wastewater. The titleholders are responsible for achieving the requirements of NTPA 002.

Proposed Projects

- Projects of feasibility studies for construction of pre-treatment plants in the following towns: Timisoara, Resita, Craiova, Ploiesti, Iasi, Galati, Braila, Mangalia, Zalau, Bucuresti, Campulung Muscel, Deva.

  These projects have to be considered, while preparing the projects of the respective WWTPs for the human settlements mentioned above. The recycling possibilities are the major issue to be studied.
- Training programmes for operation staff.

  This non-structural project is intended to avoid the malfunction of pre-treatment plants, which are to be provided for the titleholders who are to use the public wastewater collection system. The project will comprise guidelines for operation of specific wastewater treatment (galvanization, showghter houses etc.).
- Design and operation instructions for specific wastewater treatment plants

  This project has been proposed to ensure the proper operation of pre – WWTPs. The project comprises specific instructions for the designers and operators about the parameters, which have to be taken into consideration.

- **reinforce control measurement activities.** It is important to define proper measurement and control equipment. This element regards the market study for the best equipment available to measure the parameters required to control the process of treatment (e.g. pH, temperature, oxygen concentration, conductivity etc.). Monitoring of effluent quality is important for putting into evidence all the time the quality of the effluent discharged into the public sewage collection system. In this context, it is necessary also to provide warning and intervention systems in case, that some dangerous quality indicators are exceeded. This is related to the automatic systems of warning or blocking the discharge of wastewater when danger appears.

- Training courses for operational staff. The staff would be trained to realize the responsibility and to pay attention to all quality parameters of wastewater to be discharged.

For this activity the following project has been identified:

Proposed Project

- Guide of equipment consisting of the measuring and control apparatus (warning, as well) for wastewater categories in pre-treatment plants.

- **create favorable framework conditions (improvement of legislation, and environmental legislation).**, Although there are some new norms which have been set up (e.g. NTPA 002, NTPA 001) it seems they do not cover the whole area of this issue, therefore it is important to identify gaps in the existing legislation. It is also important to undertake measures for harmonization of Romanian specific norms with those of EU. This is important to fill the gaps identified in Romanian legislation.

  Moreover, norms on wastewater quality have to be established for wastewaters to be discharged, as well as norms on emission factors. Coercive measures have to be applied. There are no emission factors for specific economic activities in Romania. These emission factors are elements to control pollution by taking into consideration the quantity of the specific pollutant to be discharged e.g. kg BOD 5 per tone of meat resulted from the factory and per day, or per year. By this element the total discharge of pollutant (e.g. kg BOD per day or per year) could be evaluated by multiplying the production quantity with the emission factor. Once the quantity of pollutant discharged exceeds the authorized quantity the respective titleholder is to be fined. Coercive measures would be important element to make the operators of pre-treatment plants to be more responsible.

  It is planned also to establish education in school, social – economic units (manuals, folders, posters etc.). This element would have important influence for creating favorable conditions to achieve a suitable operation of pre-treatment plants.

  Regular information on polluters for population have to be provided and involvement of public in the decision making process facilitated. Population might play an important role for local environment authorities to set up measures and terms for titleholders to comply with the regulations. Public participation is provided in the procedure of authorization by the new law of environmental protection.

  For this activity the following projects have been identified:

  Proposed Projects

  - Elaboration of ecological education programme

    This project is to focus the aspects of necessity to realize the importance of pre-treatment of wastewater before discharging into the public sewage collection system. The project will comprise organized workshops, meetings, leaflets, actions of mass media, and other educational means.
  - Code of behavior for foreign investors

    The project will comprise a set of measures to be taken by foreign investors. Although these measures are not yet included in the domestic legislation they have to be anticipated in order to set up their economic activities in environmentally sound conditions.

- Harmonization of legislation on wastewater pre-treatment with EU provisions

  The contact of the project has been discussed above when harmonization of domestic legislation with EU legislation has been presented as an important element of this activity.
- Greening the curricula" NGO

  This project comprises a set of actions with NGOs to create a "green" aspect of economic activities located in urban areas. These actions will suppose to be meetings, folders, posters and mass media means.

(iii) Implementation of proper management of solid wastes

The importance of this result consists of alleviation or elimination of groundwater pollution and finally, surfaces water pollution. There are cases where solid waste deposits location is on the bank of rivers, creating serious impacts on natural resources. Due to the fact that these deposits are not well isolated water leakage determines the pollution of groundwater and rivers with heavy metals and organic substances. That is why implementation of proper management of solid waste is an important result within the framework of pollution reduction of water resources.

In order to achieve this result, several activities are required in the following areas:

- Waste collection;
- Solid waste management;
- Solid waste disposal.

The necessary activities to achieve the result are to:

- **implement the selective solid waste collection.** It is important to evaluate situation. In order to start going with this activity it is necessary to know an inventory of the existing situation – the composition of the solid waste the way how they are disposed off, the public attitude with the selective waste collection issue etc.

  Pre-feasibility study should be carried out to determine selective collection of waste. This is important for realizing the optimum solutions to achieve the selection of garbage in the pre-collection stage. In this context, it is necessary to identify alternatives. It refers to the versions, which are to be analyzed in order to choose the optimum technical solution to implement the selective solid waste collection.

  Moreover, measures have to be undertaken to involve all the interested parties. It will enable the attraction of responsible bodies, as well as public to act for achieving the selective collection of solid wastes. The measures taken should regard incentives to achieve selective collection of domestic solid wastes. It is important to educate population as regards selective solid waste collection. If the population do not realize the importance of selective solid waste collection the activity will not be going on. That is why the education of population to apply selective solid waste collection is essential to achieve this activity. The public has to be informed also regarding solid waste management about the effects of selective solid waste collection. Public information means public actions to achieve selective collection of household solid wastes.

  Measures have to be undertaken to provide the financing sources to achieve the project. The financing sources should be made available to provide three – four containers for individuals to dispose of their solid wastes: paper, textiles, metallic wastes, batteries and mercury lamps.

  In addition to above mentioned, it is necessary to build-up infrastructure. The pre-collection system should be enlarged. To achieve the selective collection of solid waste activity, the actual system of solid waste pre-collection from the blocks should be adjusted, in order to have special facilities for metallic, paper, or hazardous solid wastes disposal.

For this activity the following projects have been identified:

Existing/On-going Projects

- Selective collection of solid wastes at Piatra Neamt

  This project has been mentioned by the participants in the workshop. The project contains the means to achieve selection of glass, paper, metallic and vegetables in the precollection stage. It is intended to be a demonstrative project.

Proposed Projects

- Setting-up training centers

  The project comprises the means to organize centers in the main regions of Romania (Bucharest, Timisoara, Cluj, Iasi and Constanta) to train the personnel responsible for selective solid waste collection.
- Equipment for selective management of solid wastes

  The project proposed comprises the necessary equipment and operation instructions to achieve solid waste as well as the costs involved for this activity.
- Campaign for raising public awareness

  The project proposed comprises a set of measures like meetings, posters, folders or other mass media means to raise public awareness for selective collection of solid wastes. It is intended to put into evidence the advantages of this activity and to propose legislative incentives for those who will respond to the requirements resulted from this activity.

➢ **undertake measures to facilitate solid waste management optimization.** It is necessary to evaluate the situation of solid waste management. To know the existing situation and to have a real inventory of the existing unit operations applied for solid waste disposal is essential to project an optimum solid waste management. To find out the optimum solution for solid waste management is necessary to know where are we going from.

Appropriate measures have to be introduced in order to alleviate the environmental impact of solid waste management. This is important for realizing the main environmental factors, which might be affected by the solid waste management and how this impact could be alleviated by taking proper measures.

The procedures and regulations for legal appliance have to be elaborated in order to apply for authorization of some economic activities should comprise specific obligatory actions to be taken in order to avoid environment injuries. Measures to be undertaken have to be defined in accordance with the international legislation. The international legislation, especially EU legislation should be taken in view while taking measures for solid waste management. The rules of import-export of solid waste should be set-up, especially taking into account the hazardous wastes. In addition the enforcement of the law of solid waste is necessary by coercive and incentive measures. The law of solid waste is under discussion in the Parliament.

The incentives on those who act for a proper management of solid waste should be developed. Coercive measures might have less effect than encouraging measures, especially in the Romanian area. In this context, investments in solid waste management projects have to be promoted. This element should be taken in view while talking about the solid waste management, especially when the win-win process is involved. Some valuable waste should be put in value. In addition, financial mechanisms for solid waste management have to be developed, in particular in order to reach the result of a good management of solid waste. Incentive measures, as well as coercive measures should be

taken into consideration. Both types of measures should be taken into consideration-coercive and incentive measures. It is necessary to implement some specific courses in the education system. Some education measures should be set up in order to have a positive response from the public when the actions are to be taken to manage solid waste.

The best economically sound measures to abate the environmental impact of the existing solid waste facilities have to be provided. The existing landfills are not safety for environment being insulated and almost exhausted. Some technical solutions should be applied to isolate the existing deposits and to put the exhausted ones in the natural conditions. Moreover, it is required to facilitate experience exchange among companies. Some companies have reached good results in managing solid waste and their experience should be shown to the other companies dealing with this problem.

For this activity the following projects have been identified:

Existing/On- going Projects

- Project "Center of Resources" for NGO.

  It has been found that this project is an existing one (Galati, Alba Iulia NGOs representatives).

Planned Projects

- Draft project of the Law of Solid Waste

  The Law of Solid Waste is under designing process.
- Training of community active members

  This non-structural project comprises a set of training courses for NGOs representatives, as well as for local environmental authorities. An external assistance seems to be necessary.
- Setting up offices for ecological advisers

  The project consists of institutional building measure to set-up county offices for ecological advisers, which could offer technical assistance for proper measures to be taken to get rid off solid wastes in a sound environmentally conditions.

Proposed Projects

- Setting-up of training centers

  This project refers to the training of operators dealing with solid waste management. Generally these centers should be organized in Technical Universities or in National Research Institutes for Environment (ICIM, UTCB etc.).
- Campaign for raising public awareness

  This project refers to a set of measures to raise the public awareness, like meetings, posters, folders, and other mass media means.
- Harmonization of solid waste management legislation with the EU legislation

  This project is to set-up the legislative initiatives for approximation of EU legislation with the domestic legislation. This process corresponds to the general policy of the Government for adherence to the EU.

- **ensure the appliance of proper solid waste disposal.** Involvement of authorities and the public has been considered important to achieve the result because the authorities (local and central), as well as the public should be implicated in the process of ensuring the appliance of per solid waste disposal, finding the suitable solutions for solid waste disposal.

  It is necessary to find out through evaluation the field location (sites for landfills infrastructures).The available land for solid waste deposits are scarcely met in Romania. The new owners of land cannot afford to put their land at disposal so easily. That is why this issue has been considered as an important element for the activity of disposal o solid waste.

  Measures have to be undertaken to provide financing sources in order to achieve the result by the activity of insurance of appliance of proper solid waste disposal.

  The ecological rehabilitation of the exhausted deposits is to be provided in the initial investment cost evaluation. The cost of rehabilitation of the land use should be taken into consideration by the investors. This issue has been considered to be an important element to be taken into consideration for authorizing the new investors who are going to change the existing land use.

  Efficient control of activity has to be implemented. It goes without saying that the efficient control of solid waste disposal plays an important role of a proper management of solid waste in the country. The inspectors should play an important role to make the local operators to fulfil their jobs.

  It is necessary to improve the staff qualification level. It is justified by the fact that this activity should be "mobilized" by selecting the responsible people to work in this field of activity. These people should be better appreciated in the society, better paid and better educated.

  For this activity the following projects have been identified:

  Existing/On-going Project

  - Ecological rehabilitation of Zlatna area

    This project has been identified as an existing one. The project consists in foreseeing the exhausted area of solid waste deposit.

  Planned Project

  - Creation on Environmental Fund

    This project had been proposed to be included in the new environmental low of environmental protection but it has not been accepted by the Parliament. New actions are required to have this fund available for environmental investments and for other incentives in the protection of environment framework.

  Proposed Projects

  - Ecological reconstruction of the exhausted solid waste deposit in Ovidiu – Constanta

    This proposed project comprises the introduction in the natural conditions of the exhausted deposit of slugs resulted from the Power Plant and Cogeneration of Ovidiu (Constanta county) which uses coal for energy production.
  - Lab equipment for EPAS.

    This project consists of providing the proper equipment for EPAs labs to check the environmentally sound conditions of solid waste disposal.

- Ecological deposits for domestic waste in the Danube River Delta

  The Danube River Delta is to be considered to be a special way because the sites are on water. The problem of cemetery and other solid disposals require special attention. That is why the participants insisted to solve the problem of solid waste disposal in this area with a specific attention. For the time being there is not project focusing the issue of solid waste treatment and disposal in the Danube River Delta. It seems that this issue is quite neglected by the decision-makers.
- Ecological land fills in Techirghiol, Eforie, Mangalia and Mamaia.

  In fact the solid waste coming from the Black Sea coastal cities are not well organized. The population of Constanta use to dispose of their solid waste on the beaches of Siutghiol Lake extracting in the some time sand for the construction purposes. The local authorities cannot control this problem in spite of the fact that legislation exists. That is why the project proposed should be considered with the connection with the law enforcement.
- Ecological land fills in Techirghiol, Eforie, Mangalia

  This project comprises the technical measures of find disposal of solid waste coming from the localities mentioned above.
- Requirement installation for chalk at Basarabi and the kaolin in Medgidia city.

  This project was not sufficiently analyzed it seams that this project needs more and more explanations to be put in the priority list of NEAP. Anyhow, it seems that this project is to be analyzed by the EPAS and should be regarded to be in attention of the respective title holder, which is responsible for this specific activity.

The high priority projects might be considered the following ones:

Structural projects: Modernization and development of WWTPs in Resita, Craiova, Deva, Campulung Muscel, Mangalia.

Construction of new WWTPs: Galati, and Braila, Zalau.

Non-structural projects: Guidelines on designing and operation of solid waste land-fills, control and fights against accidental pollution; Finding out technical solution for solid waste disposal in the Danube River Delta; Introduction of new instruments for water quality protection; Harmonization of EU regulations of emissions in water with the domestic legislation; Environment territorial laboratories development; Quality objectives in the activity of water quality protection.

3.3.4. Important Assumption for the Sector

Important assumptions are external factors which are important for the success of the program but lies outside its scope and not under the direct control of the program. These external factors may affect the implementation and long-term sustainability of the program. The important assumptions or external factors must be taken into consideration if the objectives defined at (the next) higher levels are to be achieved.

At the activity level, the following assumptions have been identified:

- **Provision of funds on time**

  The assurance of financial resources is a capital condition to achieve sector results. If the funds are not available no activity could take place. That is why the short - term projects must be financed in order to achieve the expected results.

- **Operational financial mechanisms**

  Financial mechanisms are supposed to be operational to make sure that activities will go on in normal way. Creation of environment fund and water fund (this fund is already created by Water Law); and using this fund for water quality protection will increase the possibility of making the activity feasible, realistic.

- **Effective and attractive taxation and tariffs policies implemented**

  Although some taxes and tariffs for water exist it seems they are not effective. "Polluters pay" principle trends to be transformed in "Pay to Pollute" principle in Romania. That is why the taxation and tariffs should be more effective. On the other hand, the incentives for those who invest in water quality protection must be applied. It seems Romanians are more sensitive when they are encouraged than when they are punished.

- **Adjustment of pre-treatment technologies while the activity profile is being changed**

  The privatization process determines changes in the activity profile of many companies. A factory dealing with galvanizing process might become a factory for non-ferrous metals processing and this is the reason why adjusting of pre-treatment technologies is necessary.

- **Development of fund raising policies (Assumptions for activities to achieve sector results)**

  The fund raising policies are capital assumption to achieve the sector results. That is why the decision-makers must realize that they have to locate money for this sector. Otherwise the situation is worsened and even the existing waste treatment facilities might become obsolete and finally unusefull to fulfill the scope of what they have been provided for.

For this sector at the results/output level the following assumption have been identified:

- **Priority of environmental protection within the government policies**

  This assumption has been identified to be one of the most important one to achieve the sector objective because the government policy determines the distribution of funds and the decisions to be made for investments in public works and territorial planning. On the other hand, the government should pay attention to comply with the provisions of international conventions, which have been signed and ratified, and this issue refers to the legal acts regarding environmental protection in the context of transboundary effects.

- **Cooperation among all stockholders**

  This assumption has been considered to be a pre-condition to achieve the sector objective because the stockholders being discharges into the public sewage collection system, they must cooperate in order to achieve the standard quality of wastewater. There are stockholders, which shares the sewage collection systems and pre-treatment of wastewater. The experience of some stockholders reaching the standard quality of the wastewater discharged should be extended to the other similar stockholders.

- **Supportive economic conditions**

  The economic conditions should be evaluated in order to achieve the sector objective. There will be not positive conditions if economic supportive condition will be not ensured.

3.3.5. Impact Indicators for Sector Results

Impact indicators have been developed for the sector objective and sector results. They define the contents of the objective and results in operationally measurable terms. For the sector objective is intended to increase water quality of the Romanian rivers.

Speaking on the base of natural water quality standards existing in Romania, the following indicators should be taken into consideration:

- About 15 percent of the degraded rivers (by their length) will be situated in the 3rd quality category according to RS 4706 - 1988.
- About 10 percent of the 3rd quality category of the natural rivers (measured by length) will go in the 2nd quality category (according to RS 4706 - 1988).
- About 5 percent of the 2nd quality category of the natural rivers will go to the 1st quality category of natural rivers.

These goals are to be achieved till the year of 2010. It has been considered that these indicators are realistic and can be achieved by taken into consideration the projects proposed with the respective assumptions put into evidence in the report.

Indicators for sector results are the following ones:

For the result 3.1:

- **About 12 percent of the population (children from rural area) are not to be exposed to the health risks caused by nitrates concentration over 45 mg/l) of ground water by the year of 2010.**

  This indicator describes the objective the actions taken to reduce water pollution in Romania. Exceeding nitrate concentration in ground water is a consequence of oxidation of ammonia coming faces, which are disposed in improper conditions. This situation is often met in the rural area where about half of the population of the country live. The percentage mentioned above has been estimated, presuming that a conventional family of four persons has at least one child. The four persons have at least one child. The estimation is based on the fact that about 10 million people out of 23 million inhabitants of Romania live in the rural area where improper individual wastewater disposal exists. This indicator could be measured easily in the ground water in rural area and in the receiving surface area in the zones, which are affected by improper management of waste. This indicator will be measured by the laboratories of the territorial health inspectorates, of the EPAs and of the water management units located throughout the country.

- **In the period 1998 - 2010 in 11 Romanian river basins, 270 WWTPs will reduce organic and nutrients load by 20 percent pursuant to NTPA 001 and agreements in force.**

  This indicator is based on the idea that the existing WWTPs and the new WWTPs which are to be constructed will reach the removal of organic substances as well as total nitrogen and total phosphorous concentrations at the designed levels. That is BOD_5 will be reduced by more than 90 percent and N and P by 20 percent. It has been assumed that the existing plants remove in average 70 percent of organic substances. The indicator could be measured by the operators in the units, as well as water management units, EPAs and health inspectorates in every zone all over the country.

For the result 3.2:

- **In 270 localities from 11 river basins, approximate 6000 economic units will reduce polluting substances discharges (heavy metals, grease, oil, petroleum, etc.) under the limits provided by NTPA 002, until 2010.**

  This indicator refers to the pre-treatment plants of specific wastewater coming from the economic activities located within the urban areas. The title holders who do not have proper wastewater treatment facilities, discharging their waters into the public sewage collection system are authorized to continue their activities, temporarily, on the base of a compliance program which comprises a set a measures and terms to reach the standard quality of their effluents. The quality parameters required are listed in NTPA 002, which corresponds to EU specific directive.

  The indicator can be measured by the laboratories of respective economic units (self-monitoring), sewage management units, water management units and EPAs which are spread all over the country.

For the result 3.3:

- **In the 11 Romanian river basins, 256 towns with population over 20,000 inhabitants will reduce the inadequate solid waste disposal sites by 50 percent and will reintroduce the recovered land in the social - economic cycle by the year of 2010.**

  This indicator refers to the solid waste disposal. According the existing regulations all these areas must be supervised by providing observation wells, which must be constructed around the landfill areas. The deposits must be constructed with the impervious conditions and controlled all the time - this is a condition, which is imposed by the existing regulations. Anyhow this indicator is expected to be in attention for public authorities forever. The indicator can be measured by means of analyzing the ground water from the surrounding wells, which are to be provided for self-monitoring systems. The indicator will be measured by the unit itself and by the laboratories of EPAs, and health inspectorates located in the respective zone. All the data are available at the respective public institutions. Every year the report on the state of environment is to be published.

  It has been concluded the reduction of river pollution is inevitable an expensive operation and one which takes many years to achieve.

  Ideally it would be desirable for every river to be unpolluted, full of fish and aesthetically pleasing.

Annexes

1. Identification of River Basin Areas

2. Situation Analysis

3. Problem Analysis

4. Objective Analysis

5. Sector Planning Matrix

6. Activities, Important Elements and Projects

7. Workshop Organization

Annex 1. Identification of the River Basin Areas

1.1. Moldavia

1.2. Muntenia

1.3. Transilvania

Identification of the River Basin Areas 1. Moldavia Annex 1.1.

Physical-Geographical Characteristics	Socio-Demographic Characteristics	Transboundary Effects as Perceived	Human/Economic Activities in the Basin
➢ Moldova surface: 53880/22,68 (km2/s%) ➢ Rivers length: Moldova 1907 km (24,97%) ➢ Volumes of water: Moldova 4020 mil. m3 ➢ Hydrographic density: Moldova 0.36 km/km2 ➢ Forests: Moldova 16967 km2 ➢ Surface water: Moldova 744.76 km2 ➢ Natural lakes: 20 Moldova	➢ Population: Moldova 4319 thousand people ➢ Solicitation of water for population: Moldova 331.522 mil. m3 ➢ Solicitation of water for industry: Moldova 480.199 mil. m3 ➢ Solicitation of water for agriculture: Moldova 111.833 mil.m3 ➢ Eviction of wasted water from population: Moldova 337.384 mil. m3 ➢ Eviction of wasted water from industry: Moldova 318.011 mil. m3	➢ Metallurgy: Moldova Republic ➢ Ukraine ➢ Municipalities ➢ Wasted waters: - Iasi (Prut) - Galati (Siret) - Braila (Danube) ➢ Agriculture ➢ Zootechnic: Iasi (Prut) ➢ Sources diffused ➢ Main Pollutants - Organic Substances - Nutrients (N, P)	➢ Agriculture Diffuse sources: - Vrancea (Focsani) – (Siret) - Bacau – (Siret) - Galati – Braila (Danube) ➢ Agriculture - Pointform sources (Agro – Zootechnic Units): Comton – Iasi (Prut) - Diffuse sources - fertilizers ➢ Paper and Cellulose - Suceava, Bacau, Piatra Neamt - Siret - Braila – Danube ➢ Oil Exploitation - Siret – Moinesti - Danube – Braila ➢ Alimentary Industry - Sugar Factory: Liesti (Siret), Trusesti (Prut) ➢ Wood Working - Suceava, Neamt, Vrancea - Siret ➢ Unferrous Metallurgic Industry - Extraction : Gura Humorului ➢ Metallurgy - Sidex Galati – Siret ➢ Petrochemical -Borzesti – Siret ➢ Municipalities - Iasi, Vaslui – Prut - Botosani, Galati – Siret - Braila – Danube

Identification of the River Basin Areas 2. Muntenia Annex 1.2.

Physical-Geographical Characteristics	Socio-Demographic Characteristics	Transboundary Effects as Perceived	Human/Economic Activities in the Basin
➢ Muntenia surface: 101190/42.60 (km2/s%) ➢ Rivers length: Muntenia 28943 km (36.68%) ➢ Volumes of water: Muntenia 10284 mil. m3 ➢ Hydrographic density: Muntenia 0.28 km/km2 ➢ Forests: Muntenia 22179 km2 ➢ Surface water: Muntenia 3284.64 km2 ➢ Natural lakes: 158 Muntenia	➢ Population: Muntenia 11626 thousand people ➢ Solicitation of water for population: Muntenia 1151.194 mil. m3 ➢ Solicitation of water for industry: Muntenia 4230.006 mil. m3 ➢ Solicitation of water for agriculture: Muntenia 1370.977 mil.m3 ➢ Eviction of wasted water from population: Muntenia 750.548 mil. m3 ➢ Eviction of wasted water from industry: Muntenia 3532.123 mil. m3	➢ Pollutants from Koslodui ➢ Local Pollution in common areas at boundaries ➢ Naval Transport (navigation) ➢ Flowing the Danube into the Sea, deterioration (eutrophication) of other countries territorial waters (Bulgaria) ➢ Pollution from wasted waters in big cities on the Danube basin ➢ Pollution with organic Substances: Arges downstream of Bucharest and Danube effects in the Danube Delta ➢ Pollution with Heavy metals upstream Boundaries ➢ Pollution with organic substances	➢ Zootechnic: - Peris (Muntenia & Dobrogea) - Oarja (Olt) - Jilavele (Jiu) ➢ Wet lands Recovery - Danube meadow - Agriculture Areas in Danube Delta - Pisciculture arrangements ➢ Fertilizers & pesticides intensive agriculture exploit - Danube meadow (Muntenia & Dobrogea) - Baragan (Muntenia & Dobrogea) - Areas (Jiu – Cerna – Motru ; Olt) ➢ Chemical industry - Factories - Pitesti, Ramnicu Valcea, Turnu Magurele ; (Olt) ➢ Mine Industry (Jiu – Cerna – Motru ; Muntenia – Dobrogea) ➢ Petrochemical oil industry - Phreatic water stratum (Muntenia – Dobrogea) ➢ Oil exploits - Teleajen, Vedea, Prahova (Muntenia – Dobrogea) ➢ Petrochemical industry ➢ Energetic Industry (Jiu – Cerna – Motru ; Olt ;Muntenia – Dobrogea) ➢ Wood exploits ➢ Nuclear power station (Muntenia – Dobrogea) ➢ Inefficiency of pretreatment in industries (Jiu – Cerna – Motru ; Olt ;Muntenia – Dobrogea) ➢ Transport (Jiu – Cerna – Motru ; Olt ;Muntenia – Dobrogea) ➢ Dredging navigable channel (deposits); Muntenia – Dobrogea ➢ Community services in the Danube Delta (Muntenia – Dobrogea) ➢ Community services (Jiu – Cerna – Motru; Olt; Muntenia – Dobrogea) ➢ Wasted water treatment - Bucuresti, Ploiesti, Targoviste Campulung Muscel (Muntenia – Dobrogea) - Craiova (Jiu – Cerna – Motru) ➢ Tourism - Prahova valley (Muntenia – Dobrogea) - Olt valley (Olt) ➢ Waters management(Jiu – Cerna – Motru; Olt; Muntenia – Dobrogea)

Identification of the River Basin Areas 3. Transilvania Annex 1.3.

Physical-Geographical Characteristics	Socio-Demographic Characteristics	Transboundary Effects as Perceived		Human/Economic Activities in the Basin
➢ Transilvania surface: 82440/34.71 (km2/s%) ➢ Rivers length: Transilvania 30254 km (38.34%) ➢ Volumes of water: Transilvania 4903 mil. m3 ➢ Hydrographic density: Transilvania 0.36 km/km2 ➢ Forests: Transilvania 24272 km2 ➢ Surface water: Transilvania 592.14 km2 ➢ Natural lakes: 17 Transilvania	➢ Population: Transilvania 6655 thousand people ➢ Solicitation of water for population: Transilvania 509.627 mil. m3 ➢ Solicitation of water for industry: Transilvania 1485.536 mil. m3 ➢ Solicitation of water for agriculture: Transilvania 21.027 mil. .m3 ➢ Eviction of wasted water from population: Transilvania 429.691 mil. m3 ➢ Eviction of wasted water from industry: Transilvania 1155.828 mil. m3	➢ Cris (H) ➢ Somes (H) ➢ Timis – Bega (Y)	➢ Organic load ➢ Nutrients ➢ Suspensions	➢ Zootechnic -pig farms (Tisa – Somes- Crisuri west side) -pig farms (Mures - Timis south side) – Tinca, Bontida, Comtim ➢ Agriculture (Nutrinnts N,P ; Pesticides; Insecticides; Phungicides) ➢ Forestry activities (phenols, suspensions, floods and erosions)
		➢ Somes (H) ➢ Mures (H) ➢ Cris (H)	➢ Heavy metals ➢ Nutrients ➢ Cyanides ➢ Other chemical products ➢ P.H.	➢ Mine unferrous industry - Satu mare, Baia Mare, Baia Borsa N- W side (Tisa – Somes – Crisuri)
		➢ Somes (H) ➢ Mures (H)	➢ Heavy metals ➢ Cyanides ➢ Suspensions ➢ P.H.	➢ Chemical activity
		➢ Somes (H)	➢ organic load ➢ nutrients ➢ lignite -sulfates	➢ Cellulose and paper activity (Tisa – Somes – Crisuri) W side, Somes - Dej
		➢ Somes (H)	➢ Heavy metals ➢ Cyanides ➢ Phenols ➢ Sustentions ➢ P.H	➢ Metallurgy - ferrous - unfferous (Tisa – Somes – Crisuri N- W side) , Pheonix – Baia Mare
		➢ Barcau (H)	➢ oil products ➢ Salt solutions	➢ Oil activities – extraction – Suplacu de Barcau
		➢ Somes (H) ➢ Mures (H)	➢ organic load ➢ bacterium load ➢ Suspensions ➢ Nutrients ➢ Detergents	➢ Community management
		➢ Import; - Danube: Belgrade - Upstream Tisa, Sava, Drava		

Annex 2. Situation Analysis of Activities Leading to Water Pollution in Specific Areas

2.1. Agriculture and Land Use

2.2. Industrial Waste Management

2.3. Municipal Waste Management

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Use of inadequate agricultural practices	➢ Existing environmental legislation ➢ Existing bilateral & multilateral agreements on Danube, Prut, Tisa, etc. ➢ Existing ecological education system ➢ Existence of some databases & monitoring systems ➢ On-going international programmes (Phare, ERBD, and UNDP…)	➢ Soil degradation ➢ Eutrophication of natural and artificial lakes and ponds ➢ Pasture degradation ➢ Affecting surface & underground water quality	➢ Affecting biodiversity in Danube & Danube Delta ➢ Affecting the water quality parameters ➢ Changes in flowing regime	➢ Lack of appropriate technical means ➢ Unfavorable economic and market conditions ➢ Inadequate agricultural policies ➢ Changes due to transition ➢ Incomplete or non-complied legislation framework ➢ Changes in ownership regime ➢ Budgetary restrictions ➢ Poor training and information of farmers ➢ Insufficient staff for controlling enforcement of legislation	➢ Association farming ➢ Information regarding alternative fertilization methods ➢ Land organization on modern basis ➢ Removal of sediments from irrigation and drainage channels ➢ Establishment of protection areas (forbidding pesticides use) ➢ Subsidizing ecological farming ➢ Ecological reconstruction using specific methods ➢ Compliance with the grazing regime ➢ Pasture rehabilitation ➢ Use of appropriate mechanical equipment ➢ Alignment of legislation regarding the use of chemicals in agriculture to EU regulations ➢ Public training and information about effects ➢ Training farmers ➢ Financial facilities for environmental investment ➢ Training the operational staff
➢ Inappropriate forest management	➢ Existence of databases & monitoring systems ➢ On-going international programmes (Phare, ERBD, and UNDP…) ➢ Existing environmental legislation (forestry code)	➢ Soil degradation ➢ Changes in hydrological regime		➢ Changes in ownership regime ➢ Immediate economic targets	➢ Land organization on modern basis ➢ Strict monitoring of wood cutting ➢ Afforestation of excessively degraded lands (with local species) ➢ Public training and information about effects ➢ Training farmers ➢ Financial facilities for environmental investment ➢ Training the operational staff

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inappropriate management of animal waste from animal farms	➢ Existence of databases & monitoring systems ➢ On-going international programmes (Phare, ERBD, UNDP) ➢ Existing land law and pastures regulations	➢ Soil degradation ➢ Eutrophication of natural and artificial lakes and ponds ➢ Pasture degradation ➢ Affecting surface & underground water quality	➢ Affecting biodiversity in Danube river and Danube Delta ➢ Affecting the water quality parameters	➢ Lack of wastewater treatment plants ➢ Undersizing of wastewater treatment plants ➢ Outdated technologies	➢ Building on farm wastewater treatment plants ➢ Subsidizing ecological farming ➢ Re-equipment and updating the wastewater treatment plants ➢ Training farmers ➢ Financial facilities for environmental investment ➢ Training the operational staff ➢ Splitting huge pig farms into smaller units
➢ Inappropriate agricultural practices within protected areas (Danube Delta) and improper hydrotechnical works performed in the Danube flood plains and Delta	➢ Existing environmental legislation ➢ Existing bilateral and multilateral agreements on Danube, Prut, Tisa etc. ➢ Existing of some ecological education elements ➢ Existence of database & monitoring system ➢ On going international programme (Phare, ERBD, UNDP…) ➢ Ecological reconstruction funded by World Bank	➢ Soil degradation ➢ Changes in hydrological regime ➢ Changes in hydrological balance of the Danube Delta ➢ Affecting biodiversity and ecosystems in the Danube Delta	➢ Affecting biodiversity in Danube &Danube Delta ➢ Affecting the water quality parameters ➢ Changes in following regime		➢ Land organization on modern basis ➢ Removal of sediments from irrigation and drainage channels ➢ Closure of artificial channels modifying the hydrological regime in the Danube Delta ➢ Ecological reconstruction using specific methods ➢ Public training and information about effects ➢ Training farmers ➢ Financial facilities for environmental investment ➢ Training the operational staff

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inappropriate transport of liquid and solid wastes	➢ Environmental legislation ➢ Standards ➢ Unleaking and protected transport network ➢ Existing monitoring system ➢ Ecological training ➢ Performant "clean" technologies	➢ Affecting biodiversity ➢ Ecological catastrophes ➢ Aesthetics of environment ➢ Soil & subsoil degradation ➢ Pollution of surface and underground waters ➢ Reduction of the water uses do to quality degradation	➢ Water use affected by accidents ➢ Pollution of environmental factors ➢ Biodiversity ➢ Deterioration of ecological equilibrium	**Low reliability of transport system** ➢ Old and obsolete distribution network - insufficient funds for maintenance and development of sewerage systems ➢ Disrespect of constructing technologies - cost recovery not reflected	➢ Provision of necessary funds ➢ Legislation enforcement ➢ Use of reliable materials and technologies for transport system
				Maintenance staff not qualified ➢ maintenance staff not trained ➢ lack of training programmes	➢ Provision of qualified staff for exploitation
				Natural causes - earthquakes - land slides	➢ Measures against land slides
				Damages occurring while transport and handling ➢ deliberate causing of damages ➢ disrespect of technical norms	➢ Monitoring transport network

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inadequate industrial wastewater treatment	➢ Control equipment ➢ Studies, analysis, technical assistance ➢ Ecological training ➢ Existence of foreign investors, willing to invest in wastewater treatment plants ➢ Performant "clean" technologies ➢ Valuation opportunities	➢ Affecting biodiversity ➢ Human health ➢ Soil & subsoil degradation ➢ Air pollution ➢ Pollution of surface and underground waters ➢ Reduction of the water uses do to quality degradation	➢ Pollution of environmental factors ➢ Biodiversity ➢ Deterioration of ecological equilibrium	➢ Discharge of insufficiently treated wastewaters	➢ Modern technologies for treatment
				➢ lack of performant & clean technologies & equipment - insufficient technical & economic expertise - lack of funds for efficient technologies	
				➢ lack of wastewater pretreatment characteristic for technological process - procedures & methodologies for specific pretreatment including standards - insufficient funds of economic agents for pretreatment	➢ redesign, rehabilitate & modernize wastewater treatment plants
				➢ Insufficient exploitation of wastewater treatment installations - lack of quality staff for exploitation - inadequately qualified staff - lack of monitoring systems along the technological chain - lack of some laws & improper elaboration - lack of control for final effluent quality & the necessary feedback - insufficient information of public opinion, analysis & control systems characteristic for treated waters analysis and control system for treatment flux	➢ Training ➢ Compliance ➢ Enforcement ➢ Proper valuation of valuable wasters ➢ Technologies for use, reuse, Recycling ➢ ecological awareness
				➢ Regulations for equipping the ships with installation system for collecting liquid and solid wastes - insufficient capacity in designing treatment plants - insufficient funds for reequipment of treatment plants	➢ project financing and elaboration
				➢ Discharge of untreated wastewaters - lack of wastewater treatment plants - lack of funds	➢ correct sizing of wastewater treatment plants ➢ funding projects for equipping ports with wastewater treatment plants
				➢ disrespect of legislation - lack of discipline in use (exploitation) - lack of legislation enforcement	➢ issue of laws and regulations for navigable ways ➢ adequate training for exploitation staff ➢ enforcement of legislation and regulations

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Insufficient management of solid waste	➢ Environmental legislation ➢ Standards ➢ Monitoring the influence upon environmental factors ➢ Existence of recycling centers ➢ Construction behavior survey ➢ Mass media ➢ Control equipment ➢ Ecological training ➢ Performant "clean" technologies	➢ Affecting biodiversity ➢ Ecological catastrophes ➢ Aesthetics of environment ➢ Human health ➢ Soil & subsoil degradation ➢ Air pollution ➢ Pollution of surface and underground waters ➢ Reduction of the water uses do to quality degradation	➢ Pollution of environmental factors ➢ Deterioration of water quality due to repeated discharges ➢ Biodiversity ➢ Deterioration of ecological equilibrium	➢ Inadequate disposal ➢ unecological landfills -inadequate design project - insufficient financial resources	➢ Observing legislation ➢ Legislation enforcement ➢ Establishment buffer areas around waste dumps ➢ Ecological waste dumps ➢ Funding projects for safe and ecological conservation of industrial units
				➢ inadequate use of landfills - lack of specialized staff disrespect of legislation - lack of control equipment and lack of construction behavior survey - lack of legislation enforcement	➢ correct use (exploitation ➢ Qualified staff ➢ continuos monitoring of waste dumps influence upon environmental factors
				➢ Inadequate waste treatment - infiltration seepage - incorrect depositing (unsealed deposits) -lack of funds for ecological conservation of industrial units	➢ Use of ecological incinerators ➢ Ecological deposits - projects - investment

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inappropriate direct discharge of wastewater (without treatment)	➢ Existing technical know – how ➢ Available international funds ➢ Public participation ➢ Opportunities for additional training	➢ Affecting biodiversity ➢ Decrease of fishery fund ➢ Eutrophication ➢ Landscape degradation ➢ Jeopardizing human health ➢ Degradation of phreatic water (underground) ➢ Affecting the water quality indicators in catching rivers	➢ Biodiversity degradation in the Danube Delta, Black Sea and neighboring countries ➢ Eutrophication ➢ Jeopardizing human health	➢ inexistence of treatment plants - Insufficient capacity of some sewerage networks and treatment plants - authorized bodies and responsible persons are not involved and do not take the right decisions	➢ Designing and appliance of development schemes for water management ➢ Projects elaboration & their provision & financing sources ➢ Creation of new sewerage networks and reconstruction of the old ones
				➢ Inadequate legislation - no adequate financial and accountability mechanisms - inconsistency of investors donors	➢ Legislation approximation also for the access to financing sources ➢ Building of the new treatment plants ➢ Use of septic tanks
				➢ Inexistence of a system for collecting household wastewater in localities without sewerage - Inadequate activity of collecting waste household waters in localities without sewerage - insufficient civic and ecological education	➢ Legislation implementation ➢ Education and training programme

Activities leading to water pollution	**Current Strengths and Assets**	**Environmental Consequences of Economic activities**	**Transboundary effects**	**Causes leading to inappropriate activities**	**Measures to be undertaken**
➢ Inadequate use of sewerage networks	➢ Existing technical know – how ➢ Available international funds ➢ Public participation ➢ Opportunities for additional training	➢ Affecting biodiversity ➢ Decrease of fishery fund ➢ Eutrophication ➢ Landscape degradation ➢ Jeopardizing human health ➢ Degradation of phreatic water (underground) ➢ Affecting the water quality indicators in catching rivers	➢ Biodiversity degradation in the Danube Delta, Black Sea and neighboring countries ➢ Eutrophication ➢ Jeopardizing human health	➢ Insufficient qualification of the operating staff - inadequate maintenance of the obsolete sewerage system - non-compliance of the existing norms and standards	➢ Programmes for training operating staff ➢ Rehabilitation and replacement of deteriorated parts of the sewerage system ➢ Coercitive measures to comply with the norms/standards
				➢ Obsolete or improper devices, equipment or technologies - incorrect building of some works in the sewerage system - lack of equipment for labs within treatment plants - no adequate financial and accountability mechanisms	➢ Provision of performant reliable devices, equipment & measuring & control systems ➢ Identification and improvement of execution errors ➢ Strengthening of the analytical capacities and of the staff for labs
				➢ Inexistence of measuring and control systems between stages and for the final effluent (efficient or/and self-acting) - calamities, earthquakes, landslides, floods - authorized bodies and responsible persons are not involved and do not take the right decision - insufficient civic and ecological education	➢ Modernization and reequipment of the existing treatment plants ➢ Identification and rehabilitation of the deteriorated parts ➢ Adequate & stimulating taxation system ➢ Strengthening of the public participation in the process of decision making
				➢ Inadequate legislation	➢ Legislation approximation as regards environment management in the European context

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inadequate wastes management	➢ Existing theoretical know-how ➢ Available international funds ➢ Possibilities of supplementary instruction ➢ Public participation	➢ Human health is endangered ➢ Soil degradation do to inadequate disposal of wastes sludges ➢ Biodiversiry degradation ➢ Deplementation of piscicultural fund ➢ Landscape degradation in hydrographical basins	➢ Biodiversity degradation in: - The Danube Delta; - The Black Sea; - Neighboring countries ➢ Eutrophication ➢ Human health is endangered	➢ Inadequate legislation - authorized bodies do not take proper decision - lack of some norms & standards - lack of spaces suitable for wastes management - lack of performant equipment for wastes treatment	➢ Adequate organization of waste management at all levels ➢ Promotion of legislative projects advocacy ➢ Legislation implementation ➢ Ecological reconstruction of abandoned dumps ➢ Projects elaboration and equipment purchase ➢ Recycling recovery ➢ Introduction of selective collection of household wastes ➢ Development of the network for wastes collecting
				➢ lack of financial mechanisms ➢ lack of information regarding necessary technologies & equipment ➢ insufficient ecological & civic education - lack of some education programmes for the staff & the communities - no communication with mass-media ➢ no stimulating or coercive measures	➢ Creation of some information networks ➢ Elaboration of some information programmes - campaigns - workshops ➢ Organization of some instruction programmes ➢ Organization of press campaigns ➢ Approximation of the legislation for agreements and penalties

Activities leading to water pollution	Current Strengths and Assets	Environmental Consequences of Economic activities	Transboundary effects	Causes leading to inappropriate activities	Measures to be undertaken
➢ Inefficient pre-treatment of toxic and specific waters	➢ Existing theoretical know-how ➢ Available international funds ➢ Possibilities of supplementary instruction ➢ Public participation	➢ Human health is endangered ➢ Soil degradation do to inadequate disposal of wastes sludges ➢ Biodiversiry degradation ➢ Deplementation of piscicultural fund ➢ Landscape degradation in hydrographical basins	➢ Degradation in: - The Danube Delta; - The Black Sea; - Neighboring countries ➢ Eutrophication ➢ Human health is endangered	➢ Old or inadequate devices, equipment and technologies - Incorrect building of some works in the sewerage system - no information on the necessary specific technologies & equipment ➢ Inexistence of measuring and control systems between stages and for the final effluent ➢ Inadequate legislation - lack of some standards and norms ➢ Insufficient qualification of the operation staff - insufficient civic and ecological education ➢ Calamities	➢ Building of pre – treatment plants ➢ Programmes for staff training ➢ Stimulating and coercitive measures

Annex 3. Problem Analysis

3.0. General Problem Hierarchy

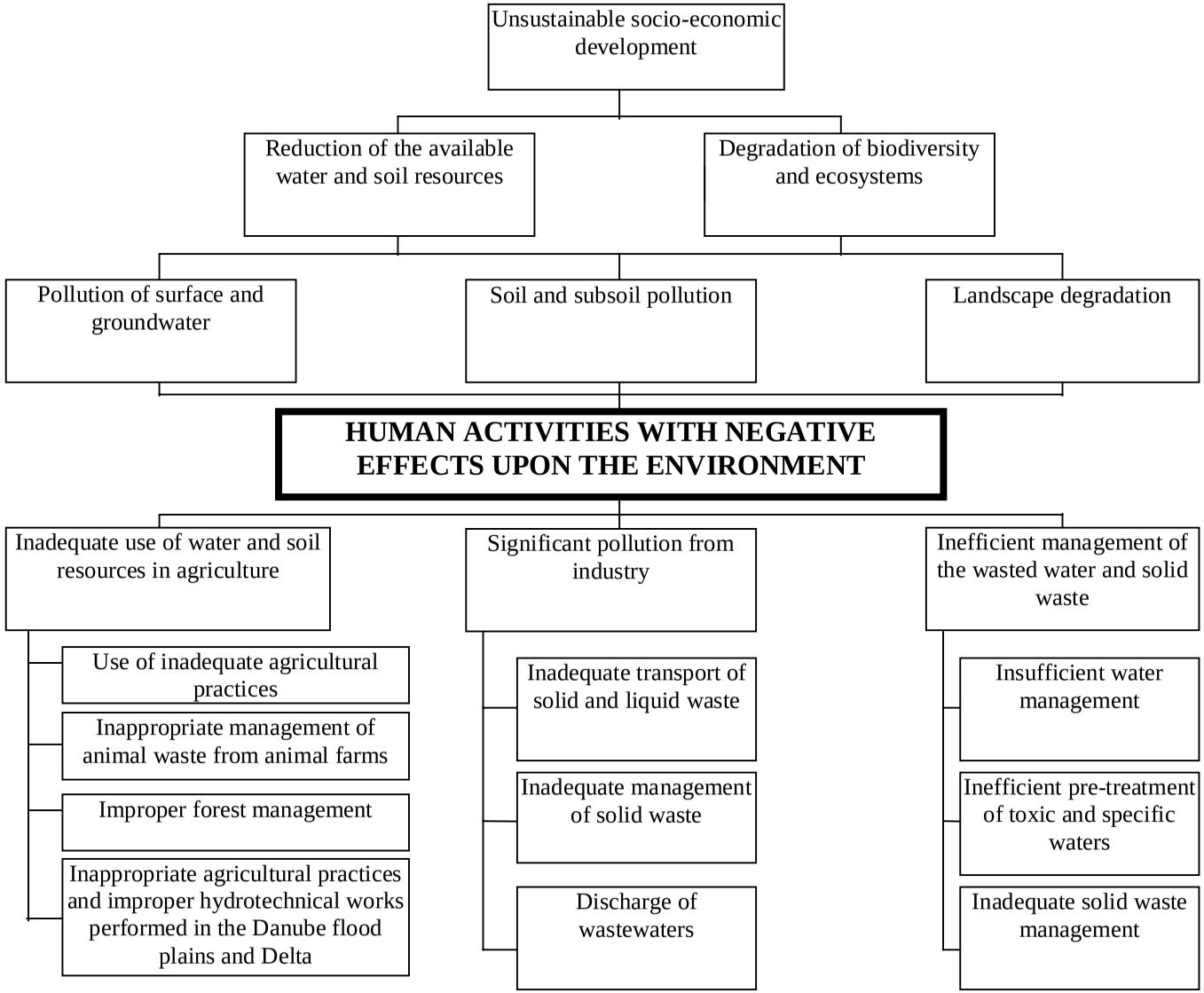
3.1. Agriculture and Land Use

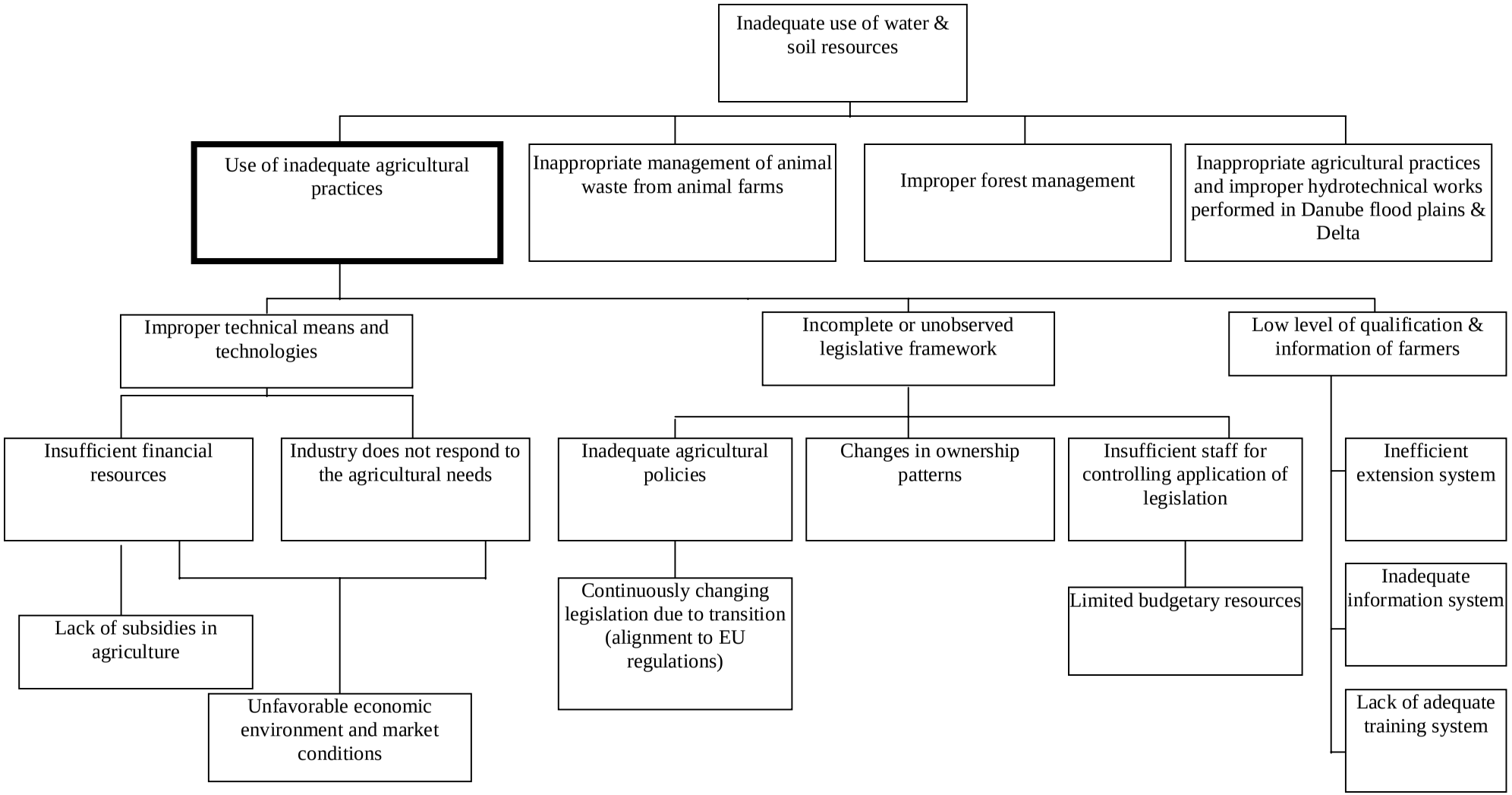
3.2. Industrial Waste Management

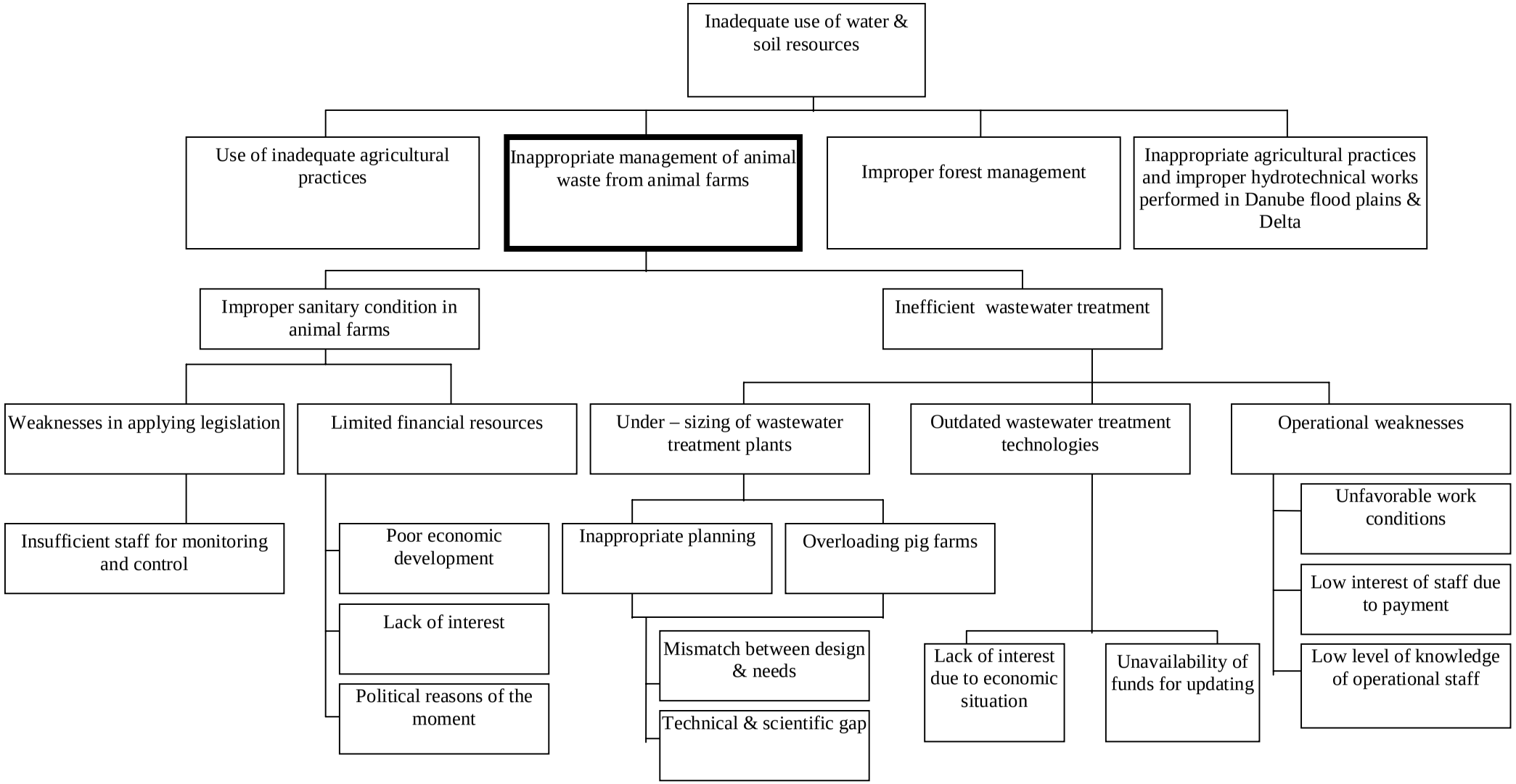
3.3. Municipal Waste Management

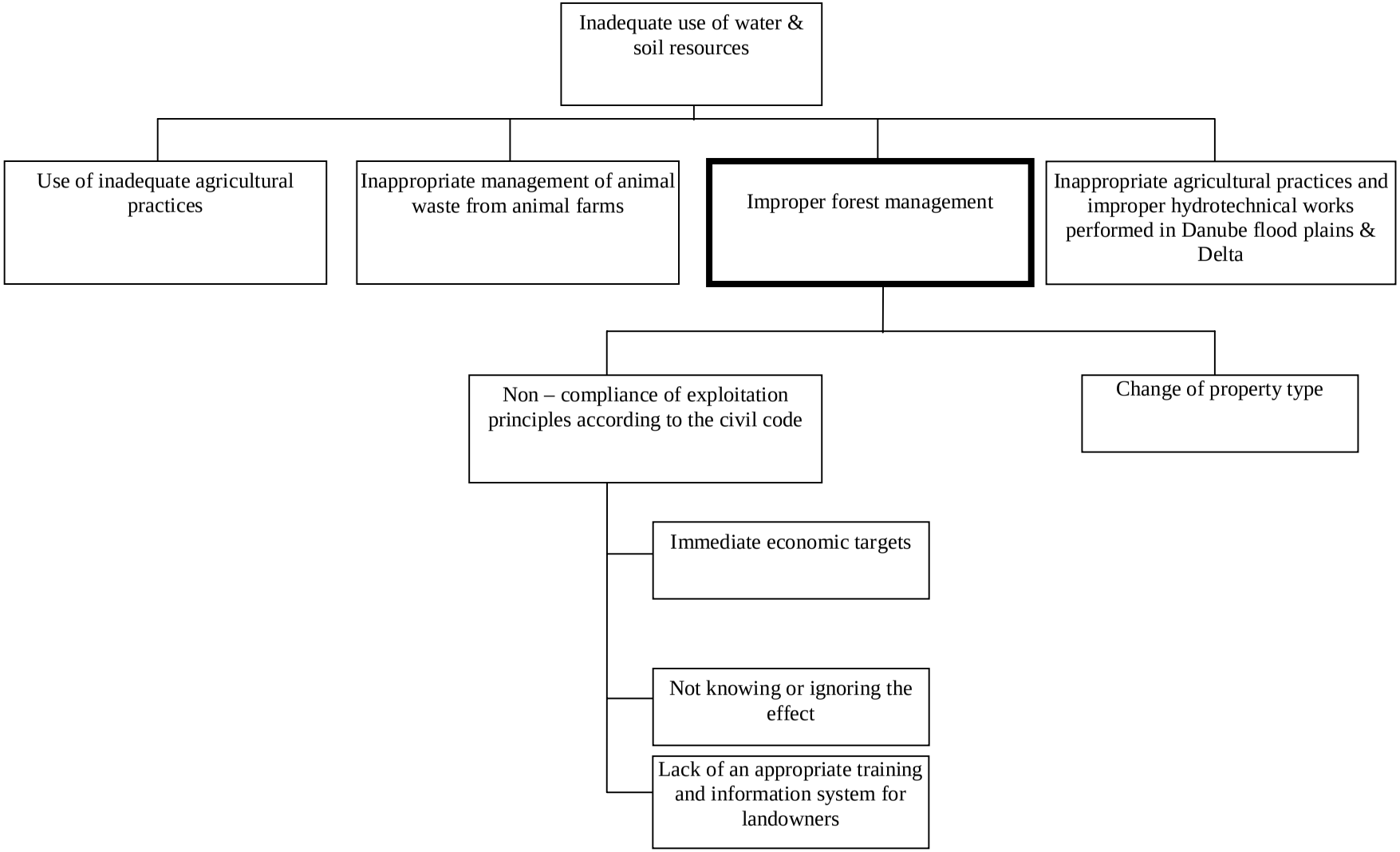
General Problem Hierarchy

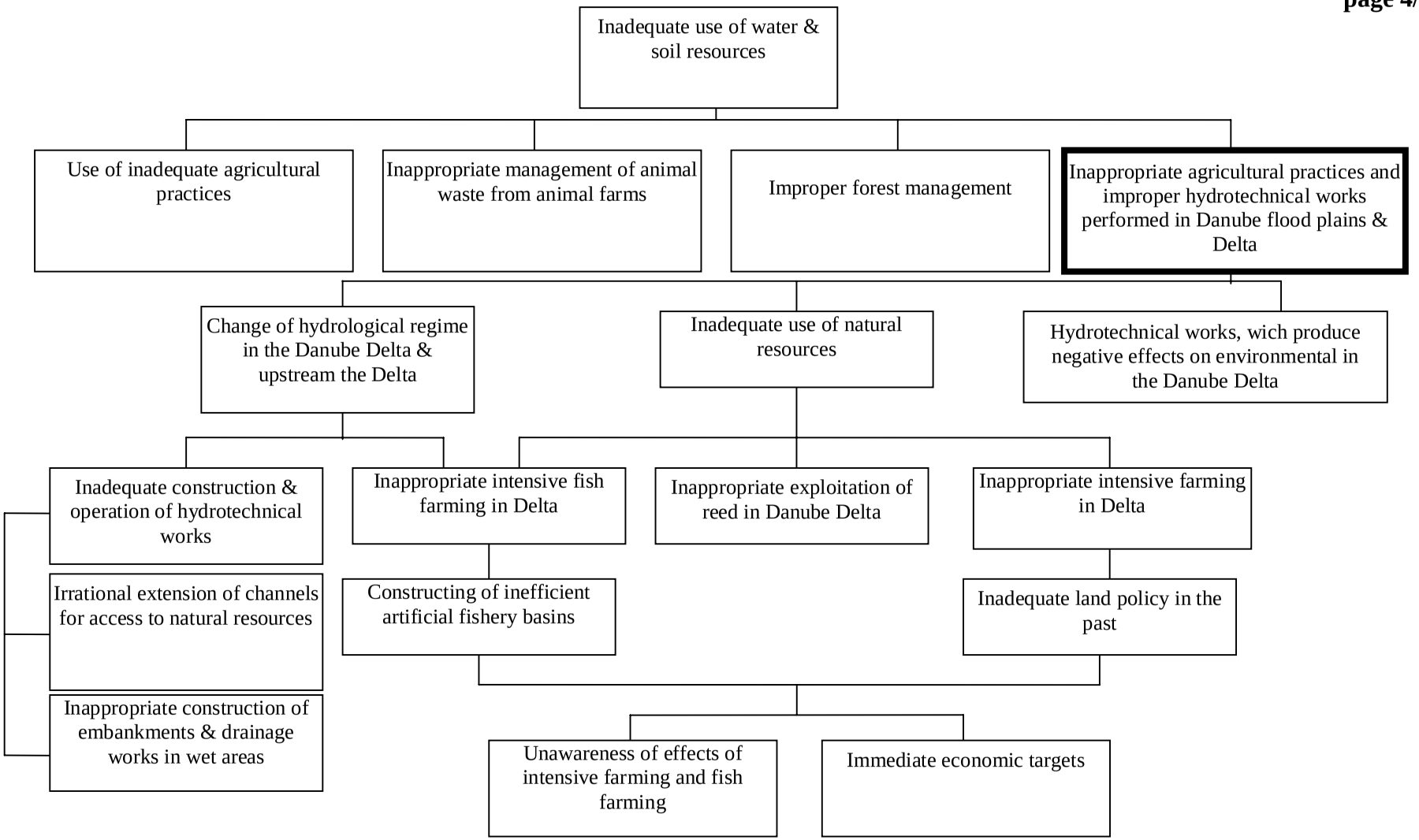
Annex 3.0.

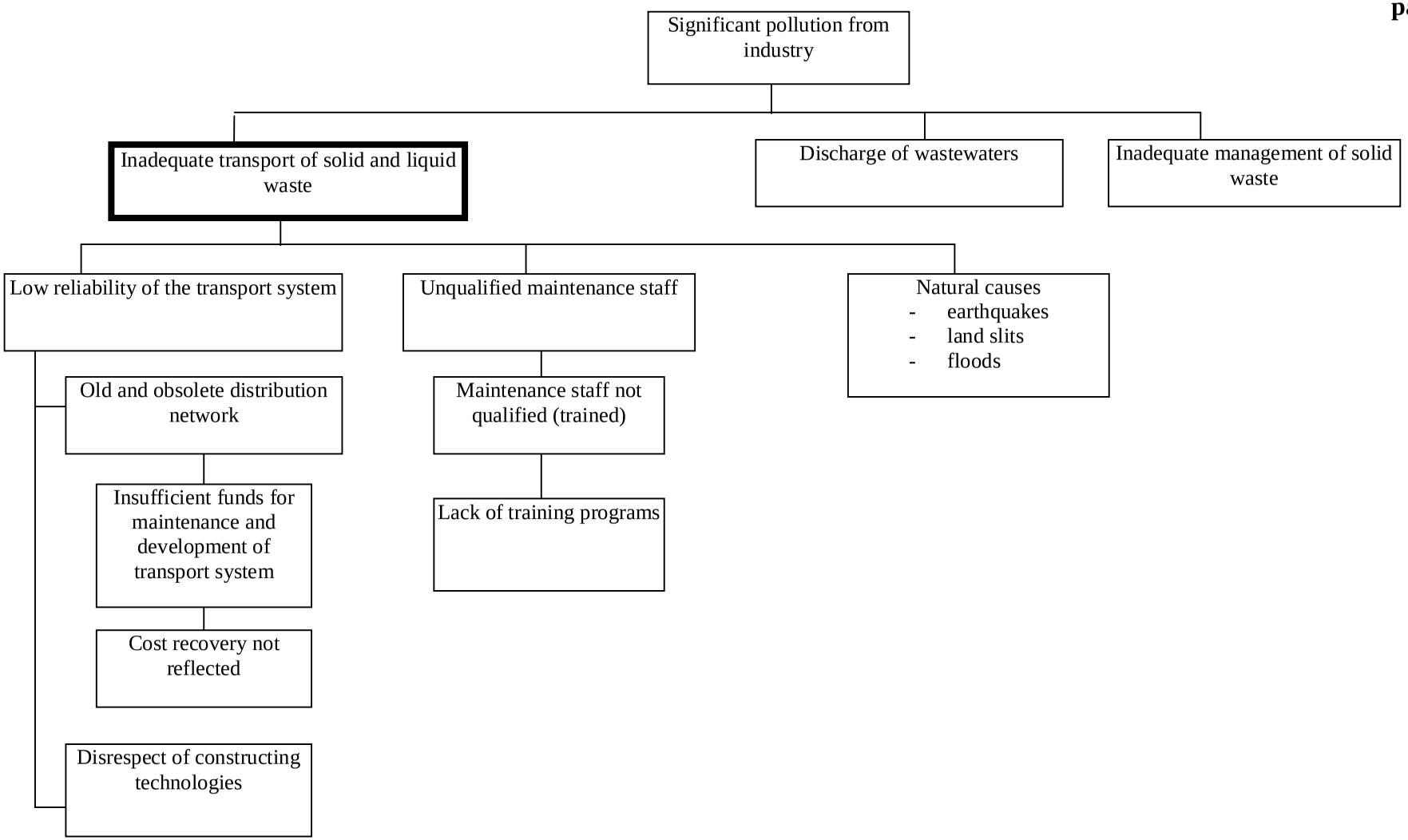


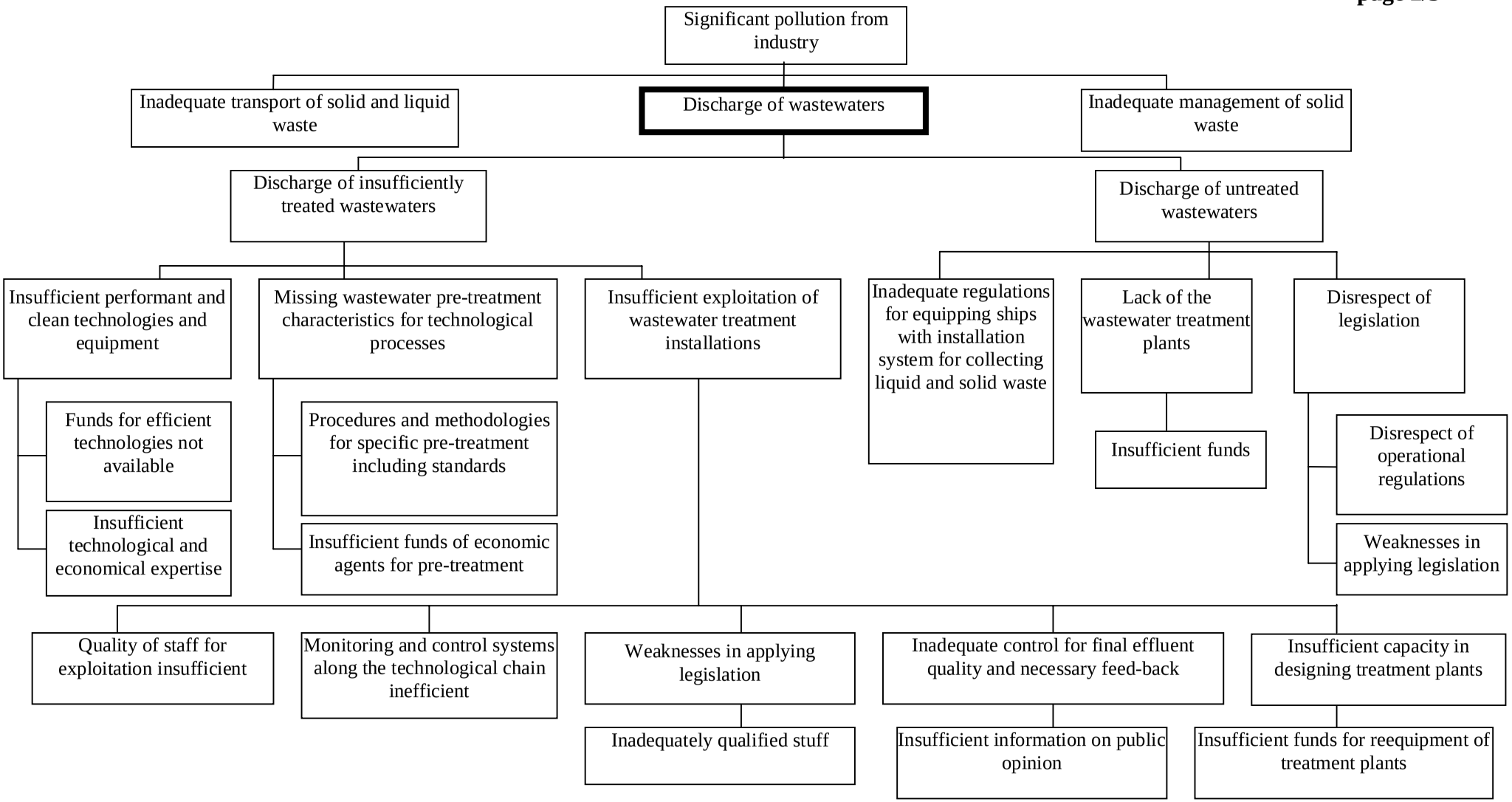

Inadequate use of water & soil resources
Use of inadequate agricultural practices
Inappropriate management of animal waste from animal farms
Improper forest management
Inappropriate agricultural practices and improper hydrotechnical works performed in Danube flood plains & Delta
Improper technical means and technologies
Incomplete or unobserved legislative framework
Low level of qualification & information of farmers
Insufficient financial resources
Industry does not respond to the agricultural needs
Inadequate agricultural policies
Changes in ownership patterns
Insufficient staff for controlling application of legislation
Inefficient extension system
Lack of subsidies in agriculture
Unfavorable economic environment and market conditions
Continuously changing legislation due to transition (alignment to EU regulations)
Limited budgetary resources
Inadequate information system
Lack of adequate training system

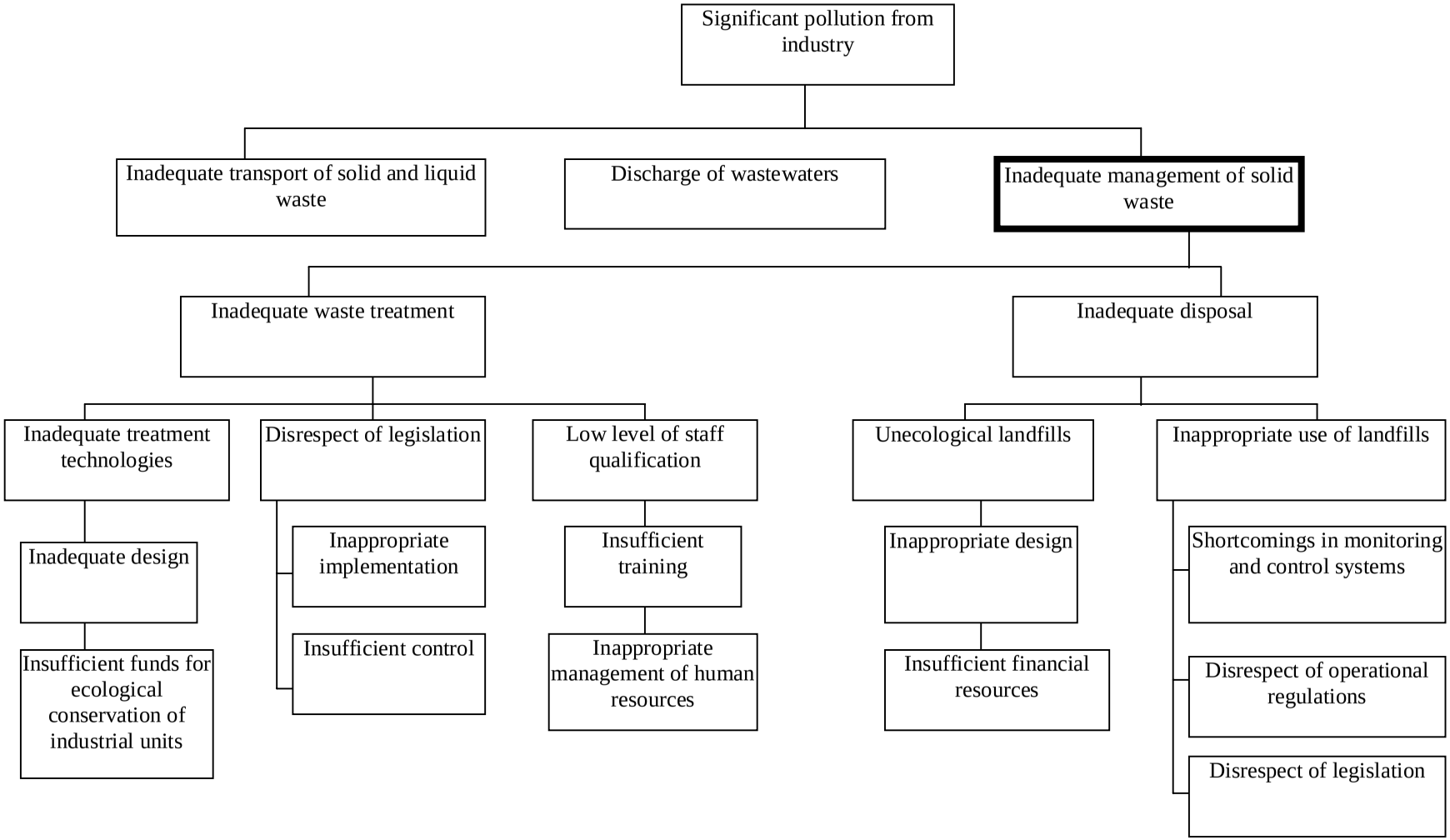

Inadequate use of water & soil resources
Use of inadequate agricultural practices
Inappropriate management of animal waste from animal farms
Improper forest management
Inappropriate agricultural practices and improper hydrotechnical works performed in Danube flood plains & Delta
Improper sanitary condition in animal farms
Inefficient wastewater treatment
Weaknesses in applying legislation
Limited financial resources
Under – sizing of wastewater treatment plants
Outdated wastewater treatment technologies
Operational weaknesses
Insufficient staff for monitoring and control
Poor economic development
Lack of interest
Political reasons of the moment
Inappropriate planning
Overloading pig farms
Mismatch between design & needs
Technical & scientific gap
Lack of interest due to economic situation
Unavailability of funds for updating
Unfavorable work conditions
Low interest of staff due to payment
Low level of knowledge of operational staff

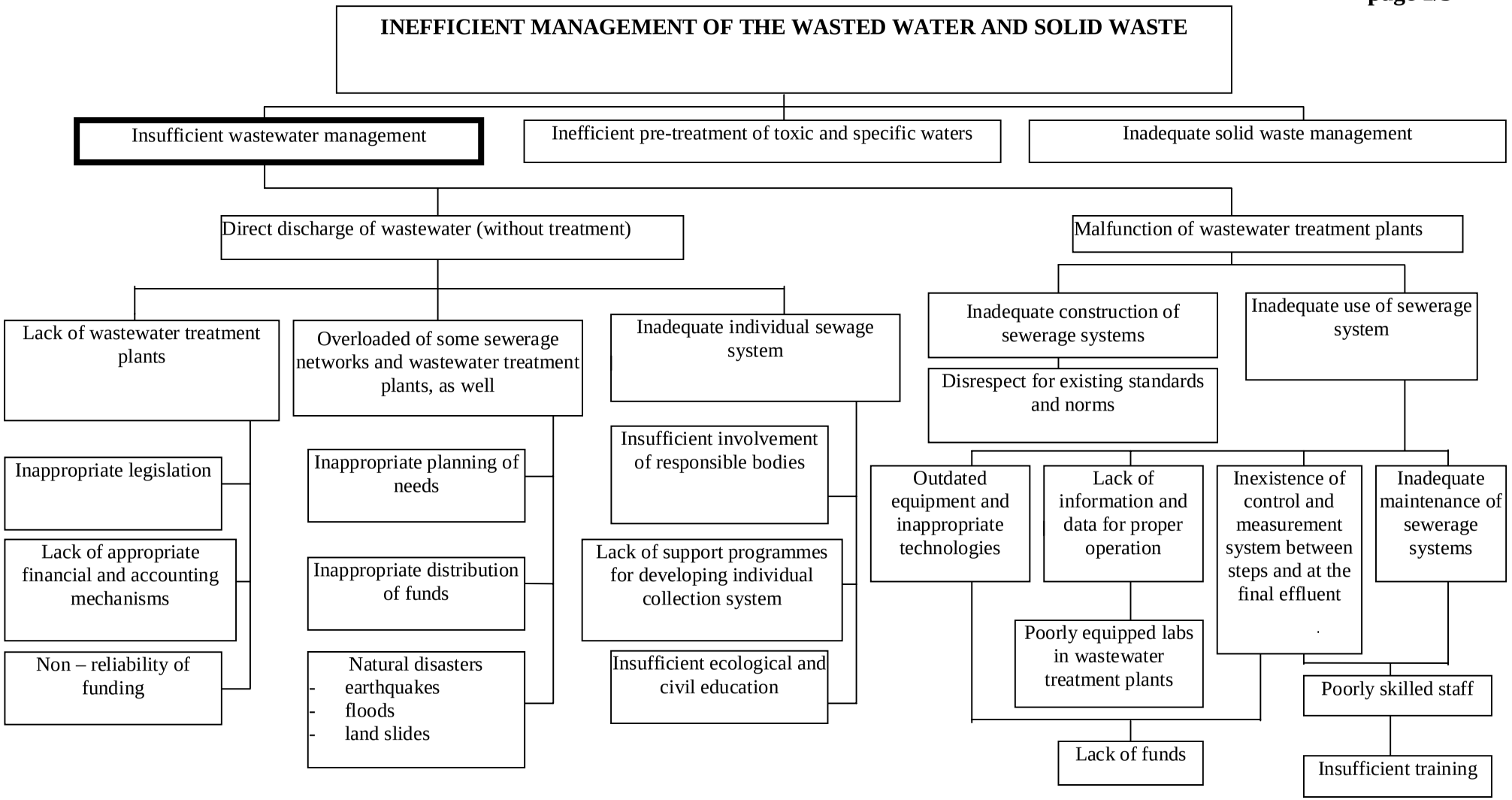

Inadequate use of water & soil resources
Use of inadequate agricultural practices
Inappropriate management of animal waste from animal farms
Improper forest management
Inappropriate agricultural practices and improper hydrotechnical works performed in Danube flood plains & Delta
Non – compliance of exploitation principles according to the civil code
Change of property type
Immediate economic targets
Not knowing or ignoring the effect
Lack of an appropriate training and information system for landowners

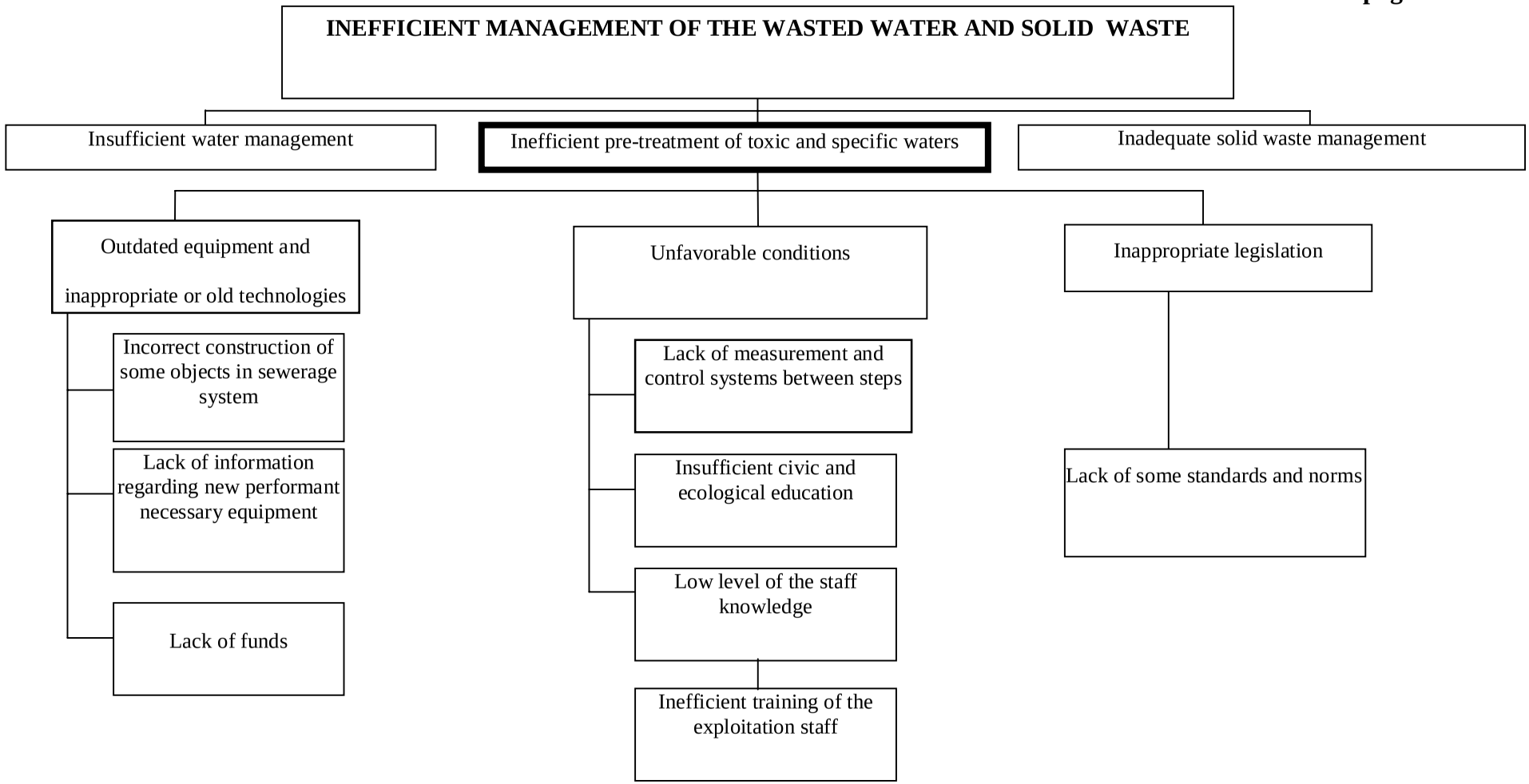

Inadequate use of water & soil resources
Use of inadequate agricultural practices
Inappropriate management of animal waste from animal farms
Improper forest management
Inappropriate agricultural practices and improper hydrotechnical works performed in Danube flood plains & Delta
Change of hydrological regime in the Danube Delta & upstream the Delta
Inadequate use of natural resources
Hydrotechnical works, wich produce negative effects on environmental in the Danube Delta
Inadequate construction & operation of hydrotechnical works
Irrational extension of channels for access to natural resources
Inappropriate construction of embankments & drainage works in wet areas
Inappropriate intensive fish farming in Delta
Constructing of inefficient artificial fishery basins
Inappropriate exploitation of reed in Danube Delta
Inappropriate intensive farming in Delta
Inadequate land policy in the past
Unawareness of effects of intensive farming and fish farming
Immediate economic targets

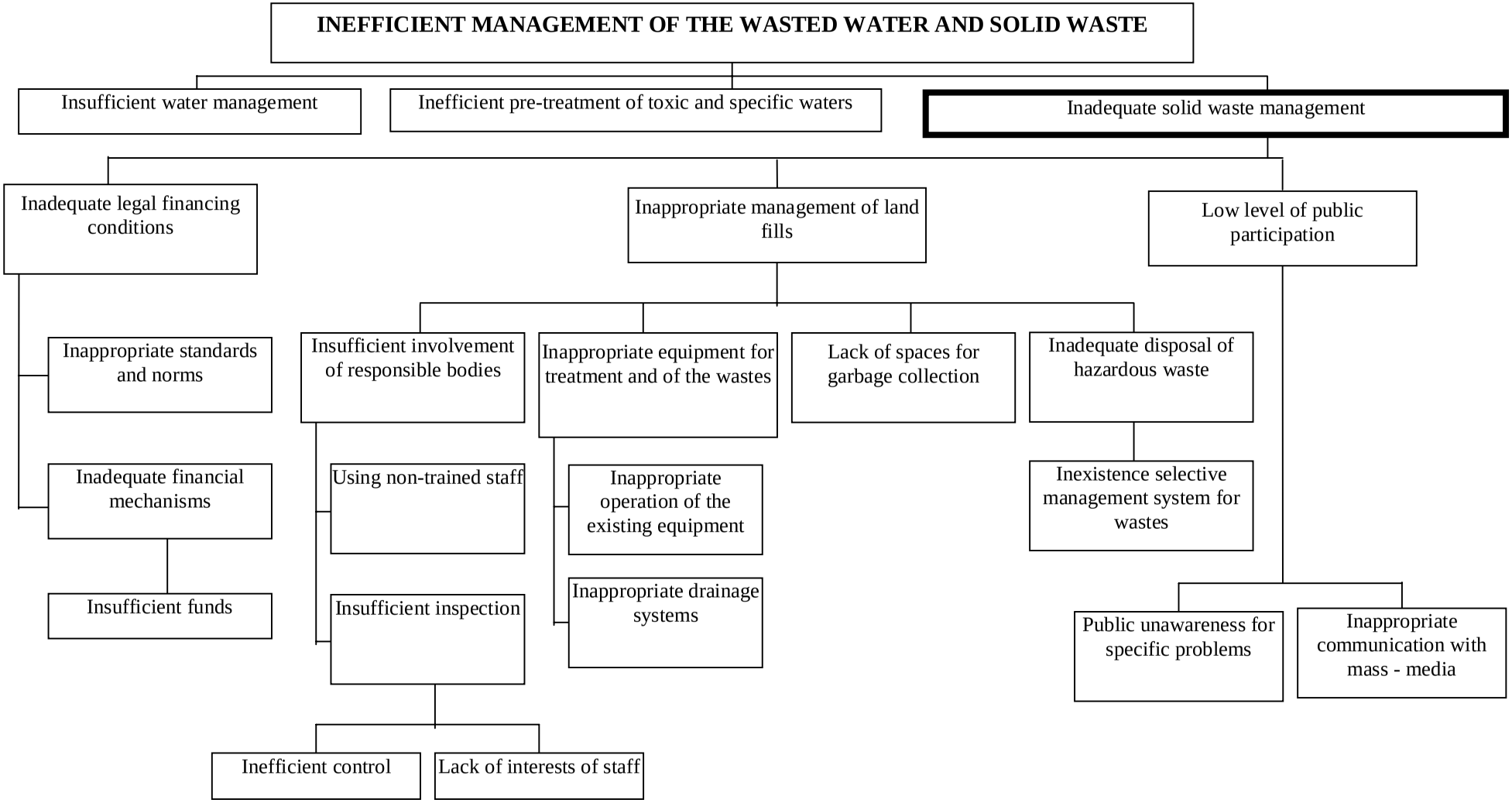

Significant pollution from industry
Inadequate transport of solid and liquid waste
Discharge of wastewaters
Inadequate management of solid waste
Low reliability of the transport system
Unqualified maintenance staff
Natural causes
- earthquakes
- land slits
- floods
Old and obsolete distribution network
Maintenance staff not qualified (trained)
Insufficient funds for maintenance and development of transport system
Lack of training programs
Cost recovery not reflected
Disrespect of constructing technologies


Significant pollution from industry
Inadequate transport of solid and liquid waste
Discharge of wastewaters
Inadequate management of solid waste
Discharge of insufficiently treated wastewaters
Discharge of untreated wastewaters
Insufficient performant and clean technologies and equipment
Missing wastewater pre-treatment characteristics for technological processes
Insufficient exploitation of wastewater treatment installations
Inadequate regulations for equipping ships with installation system for collecting liquid and solid waste
Lack of the wastewater treatment plants
Disrespect of legislation
Funds for efficient technologies not available
Insufficient technological and economical expertise
Procedures and methodologies for specific pre-treatment including standards
Insufficient funds of economic agents for pre-treatment
Insufficient funds
Disrespect of operational regulations
Weaknesses in applying legislation
Quality of staff for exploitation insufficient
Monitoring and control systems along the technological chain inefficient
Weaknesses in applying legislation
Inadequate control for final effluent quality and necessary feed-back
Insufficient capacity in designing treatment plants
Inadequately qualified stuff
Insufficient information on public opinion
Insufficient funds for reequipment of treatment plants


Significant pollution from industry
Inadequate transport of solid and liquid waste
Discharge of wastewaters
Inadequate management of solid waste
Inadequate waste treatment
Inadequate disposal
Inadequate treatment technologies
Disrespect of legislation
Low level of staff qualification
Unecological landfills
Inappropriate use of landfills
Inadequate design
Inappropriate implementation
Insufficient training
Inappropriate design
Shortcomings in monitoring and control systems
Insufficient funds for ecological conservation of industrial units
Insufficient control
Inappropriate management of human resources
Insufficient financial resources
Disrespect of operational regulations
Disrespect of legislation


INEFFICIENT MANAGEMENT OF THE WASTED WATER AND SOLID WASTE
Insufficient wastewater management
Inefficient pre-treatment of toxic and specific waters
Inadequate solid waste management
Direct discharge of wastewater (without treatment)
Malfunction of wastewater treatment plants
Lack of wastewater treatment plants
Overloaded of some sewerage networks and wastewater treatment plants, as well
Inadequate individual sewage system
Inadequate construction of sewerage systems
Inadequate use of sewerage system
Disrespect for existing standards and norms
Inappropriate legislation
Inappropriate planning of needs
Insufficient involvement of responsible bodies
Outdated equipment and inappropriate technologies
Lack of information and data for proper operation
Inexistence of control and measurement system between steps and at the final effluent
Inadequate maintenance of sewerage systems
Lack of appropriate financial and accounting mechanisms
Inappropriate distribution of funds
Lack of support programmes for developing individual collection system
Poorly equipped labs in wastewater treatment plants
Non – reliability of funding
Natural disasters
- earthquakes
- floods
- land slides
Insufficient ecological and civil education
Poorly skilled staff
Lack of funds
Insufficient training


INEFFICIENT MANAGEMENT OF THE WASTED WATER AND SOLID WASTE
Insufficient water management
Inefficient pre-treatment of toxic and specific waters
Inadequate solid waste management
Outdated equipment and inappropriate or old technologies
Unfavorable conditions
Inappropriate legislation
Incorrect construction of some objects in sewerage system
Lack of information regarding new performant necessary equipment
Lack of funds
Lack of measurement and control systems between steps
Insufficient civic and ecological education
Low level of the staff knowledge
Inefficient training of the exploitation staff
Lack of some standards and norms


INEFFICIENT MANAGEMENT OF THE WASTED WATER AND SOLID WASTE
Insufficient water management
Inefficient pre-treatment of toxic and specific waters
Inadequate solid waste management
Inadequate legal financing conditions
Inappropriate management of land fills
Low level of public participation
Inappropriate standards and norms
Inadequate financial mechanisms
Insufficient funds
Insufficient involvement of responsible bodies
Using non-trained staff
Insufficient inspection
Inefficient control
Lack of interests of staff
Inappropriate equipment for treatment and of the wastes
Inappropriate operation of the existing equipment
Inappropriate drainage systems
Lack of spaces for garbage collection
Inadequate disposal of hazardous waste
Inexistence selective management system for wastes
Public unawareness for specific problems
Inappropriate communication with mass - media

Annex 4. Objective Analysis

4.0. General Objective Hierarchy

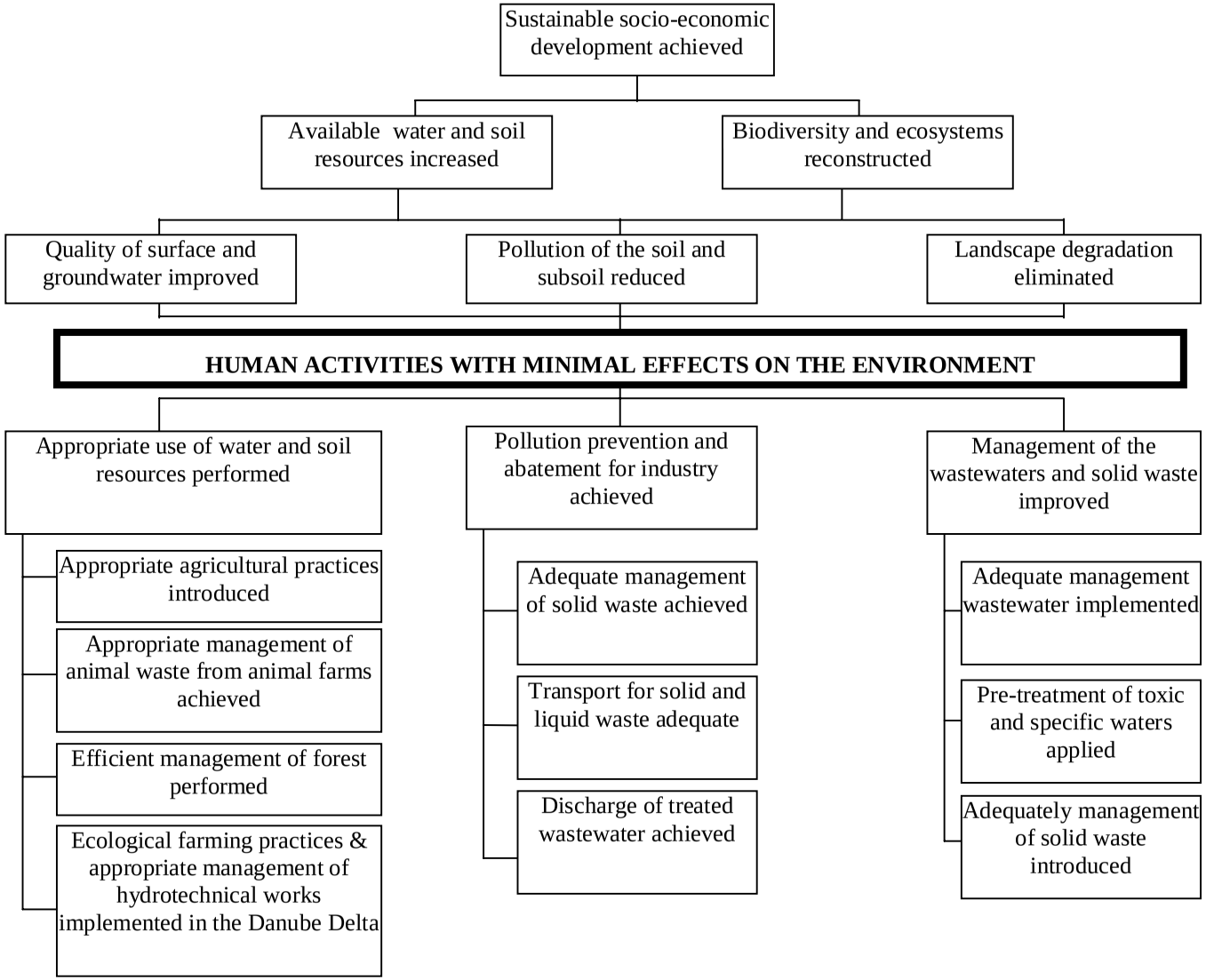
4.1. Agriculture and Land Use

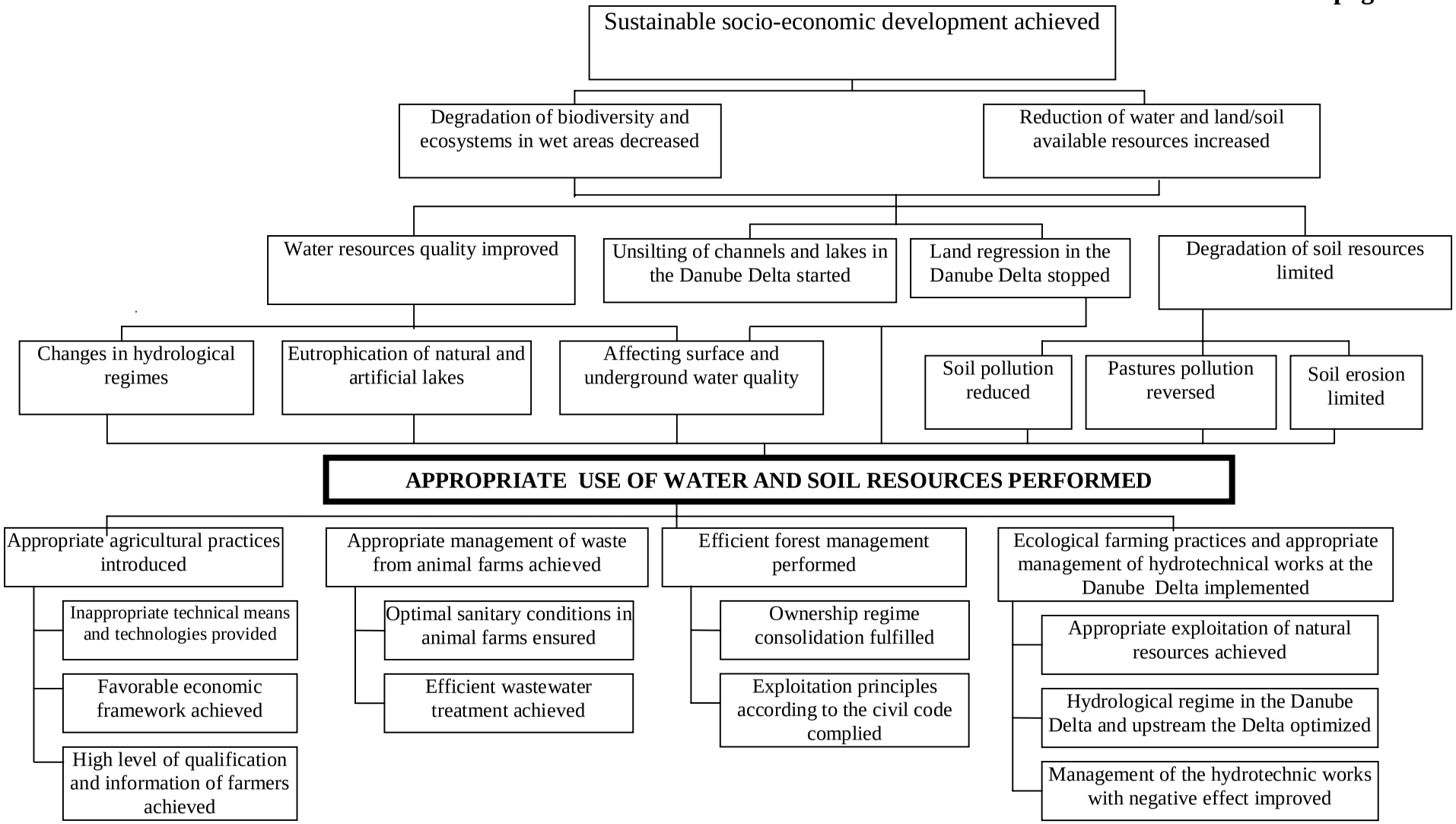
4.2. Industrial Waste Management

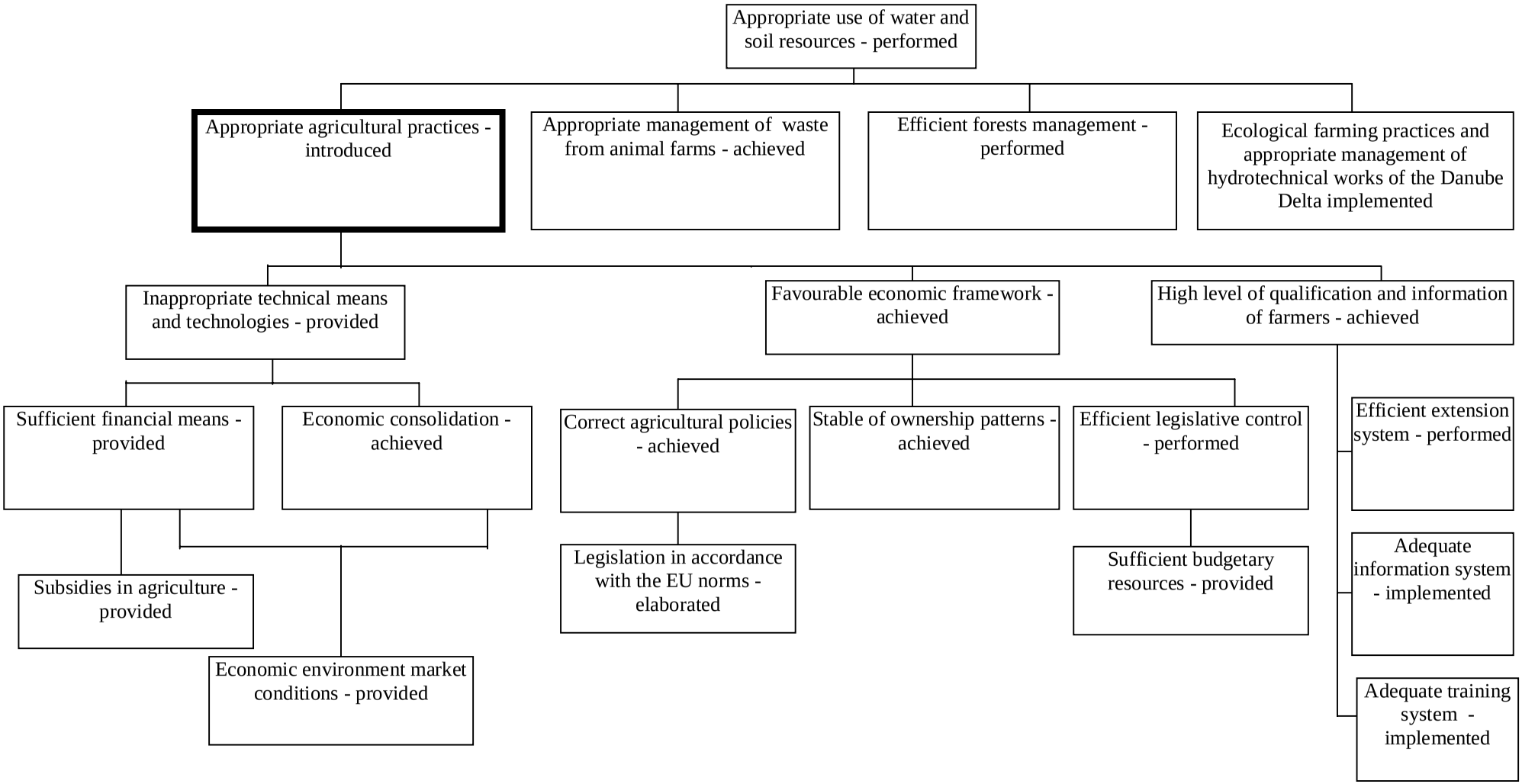
4.3. Municipal Waste Management

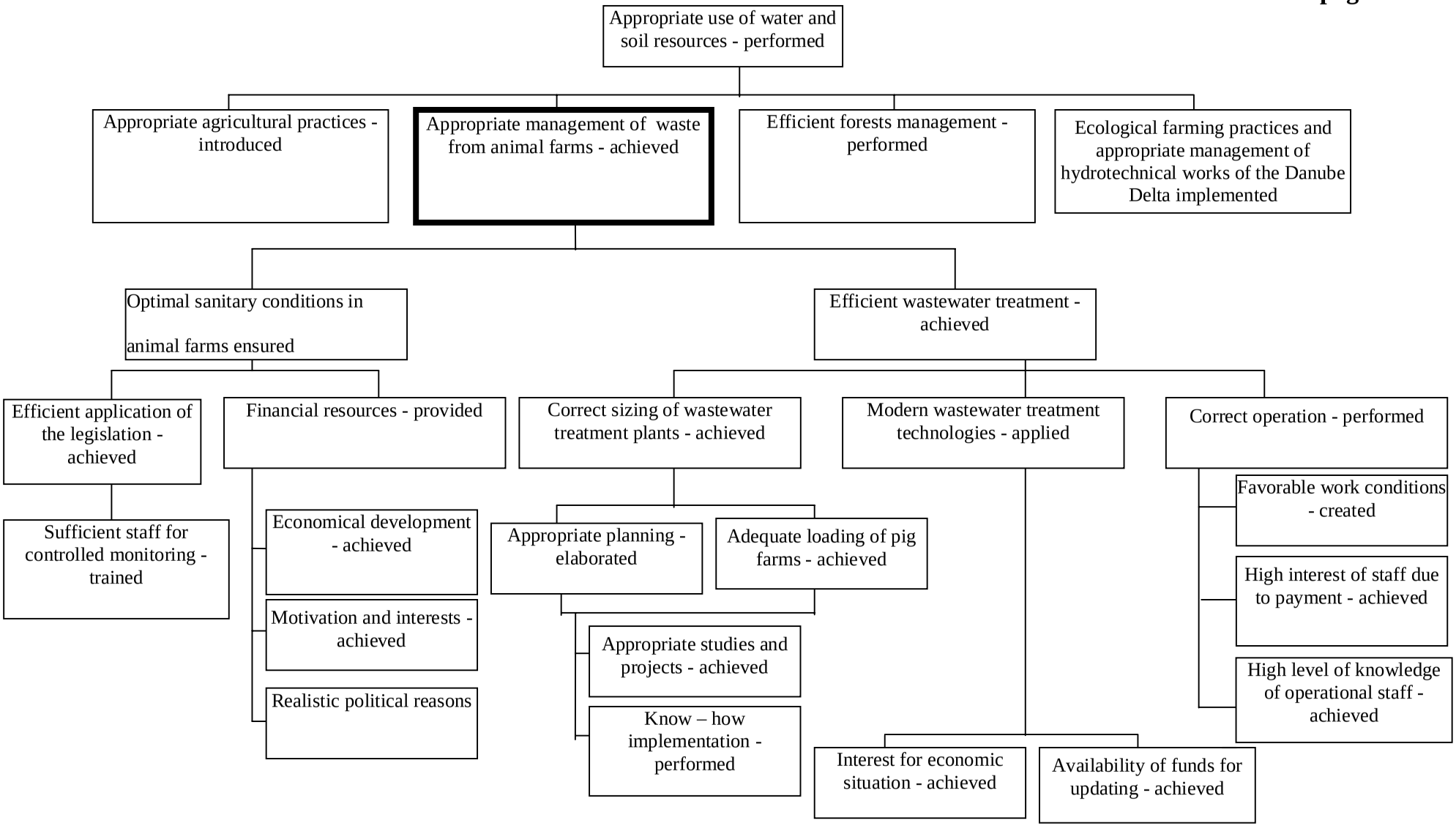
Global Hierarchy of Objectives

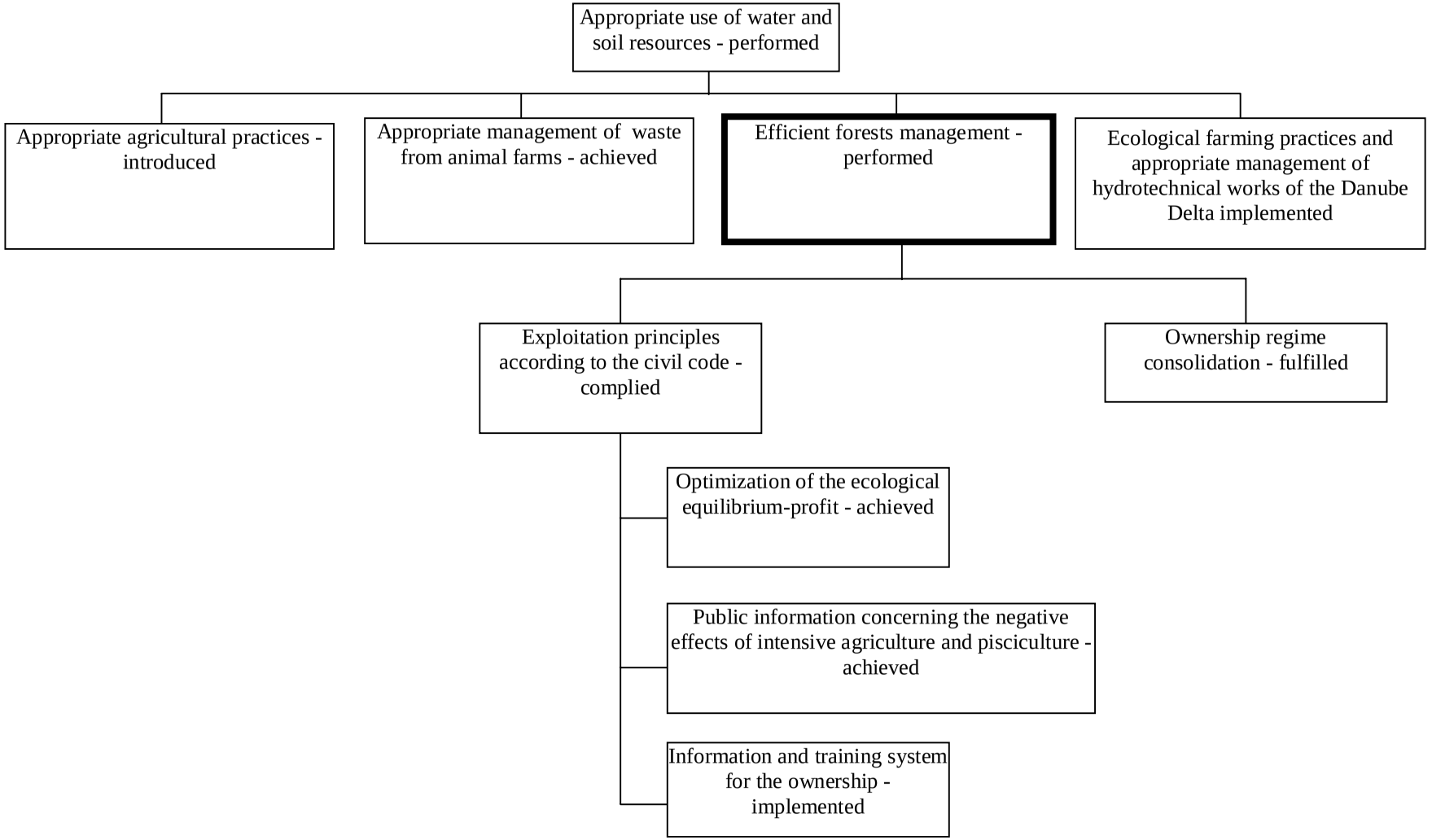
Annex 4.0.

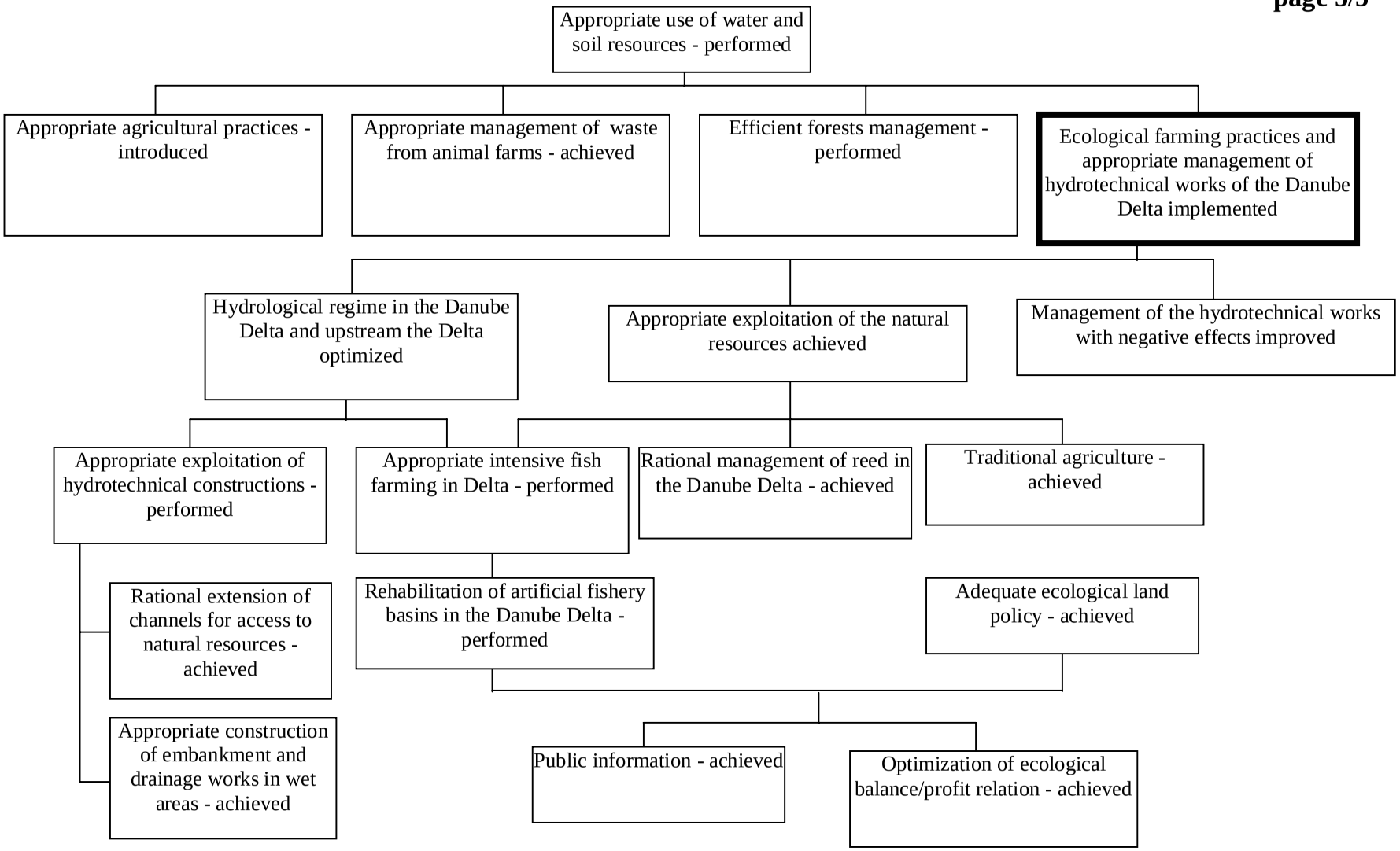


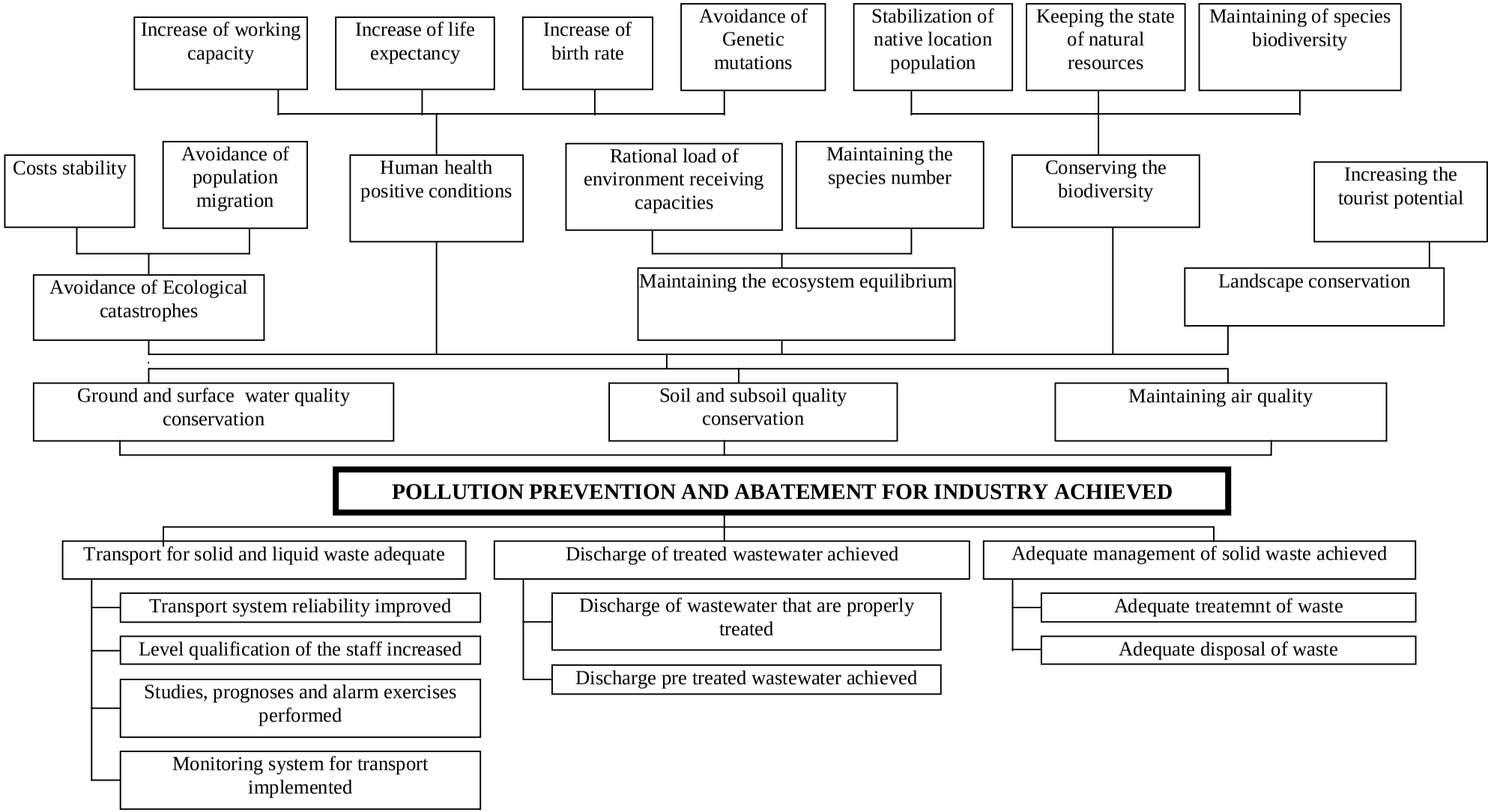

Sustainable socio-economic development achieved
Degradation of biodiversity and ecosystems in wet areas decreased
Reduction of water and land/soil available resources increased
Water resources quality improved
Unsilting of channels and lakes in the Danube Delta started
Land regression in the Danube Delta stopped
Degradation of soil resources limited
Changes in hydrological regimes
Eutrophication of natural and artificial lakes
Affecting surface and underground water quality
Soil pollution reduced
Pastures pollution reversed
Soil erosion limited
APPROPRIATE USE OF WATER AND SOIL RESOURCES PERFORMED
Appropriate agricultural practices introduced
Inappropriate technical means and technologies provided
Favorable economic framework achieved
High level of qualification and information of farmers achieved
Appropriate management of waste from animal farms achieved
Optimal sanitary conditions in animal farms ensured
Efficient wastewater treatment achieved
Efficient forest management performed
Ownership regime consolidation fulfilled
Exploitation principles according to the civil code complied
Ecological farming practices and appropriate management of hydrotechnical works at the Danube Delta implemented
Appropriate exploitation of natural resources achieved
Hydrological regime in the Danube Delta and upstream the Delta optimized
Management of the hydrotechnic works with negative effect improved

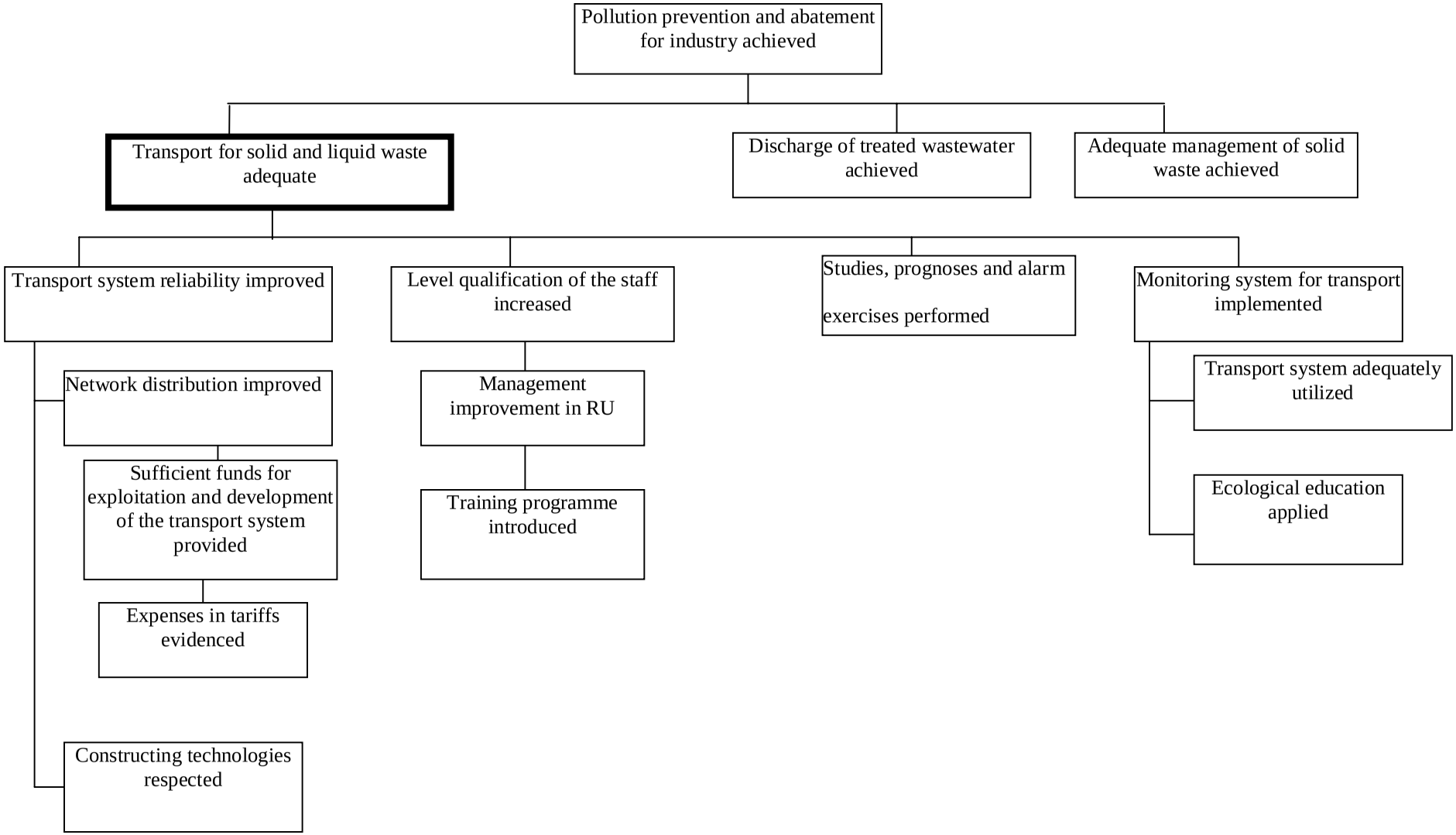

Appropriate use of water and soil resources - performed
Appropriate agricultural practices - introduced
Appropriate management of waste from animal farms - achieved
Efficient forests management - performed
Ecological farming practices and appropriate management of hydrotechnical works of the Danube Delta implemented
Inappropriate technical means and technologies - provided
Favourable economic framework - achieved
High level of qualification and information of farmers - achieved
Sufficient financial means - provided
Economic consolidation - achieved
Correct agricultural policies - achieved
Stable of ownership patterns - achieved
Efficient legislative control - performed
Efficient extension system - performed
Subsidies in agriculture - provided
Legislation in accordance with the EU norms - elaborated
Sufficient budgetary resources - provided
Adequate information system - implemented
Economic environment market conditions - provided
Adequate training system - implemented

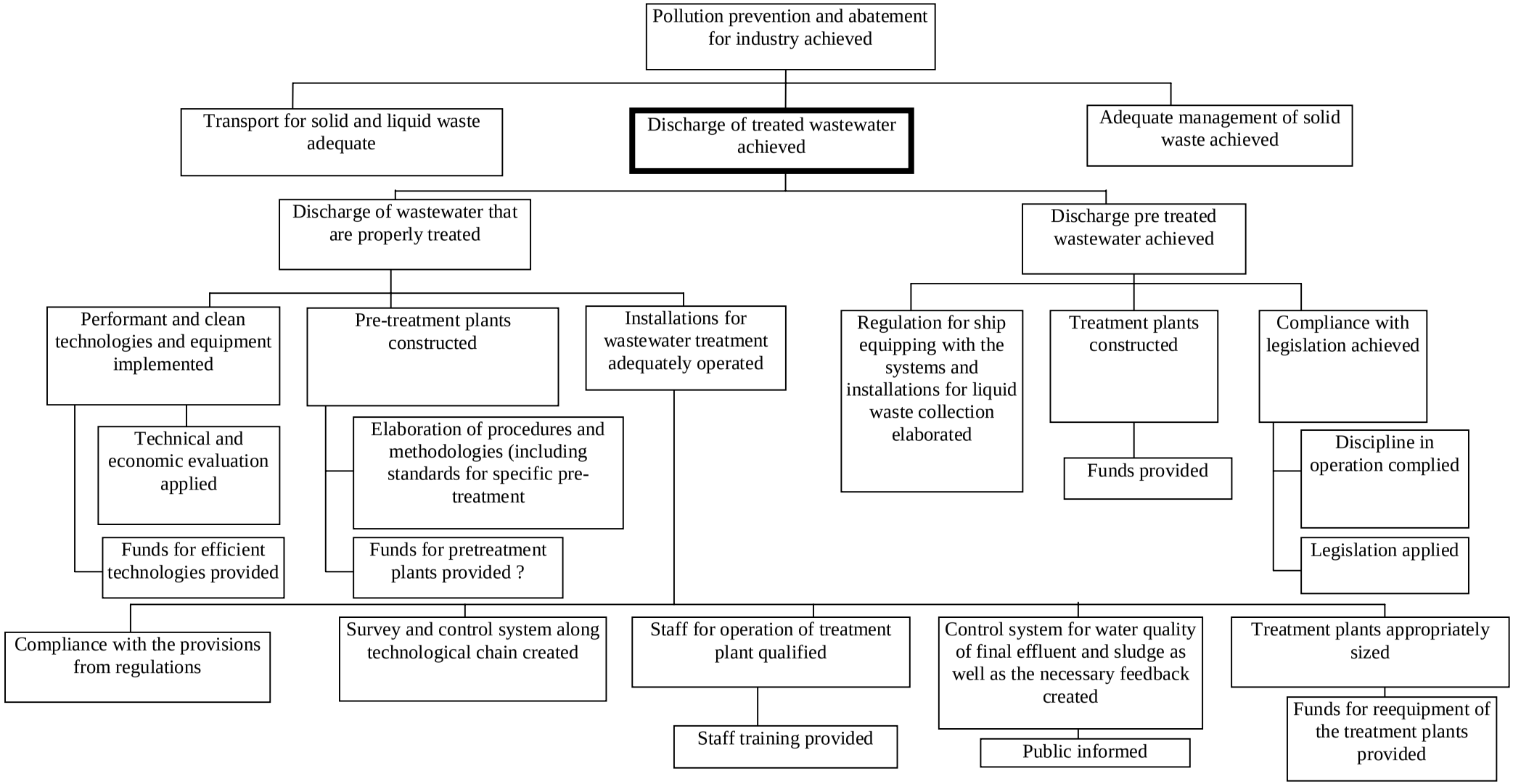

Appropriate use of water and soil resources - performed
Appropriate agricultural practices - introduced
Appropriate management of waste from animal farms - achieved
Efficient forests management - performed
Ecological farming practices and appropriate management of hydrotechnical works of the Danube Delta implemented
Optimal sanitary conditions in animal farms ensured
Efficient wastewater treatment - achieved
Efficient application of the legislation - achieved
Financial resources - provided
Correct sizing of wastewater treatment plants - achieved
Modern wastewater treatment technologies - applied
Correct operation - performed
Sufficient staff for controlled monitoring - trained
Economical development - achieved
Motivation and interests - achieved
Realistic political reasons
Appropriate planning - elaborated
Adequate loading of pig farms - achieved
Appropriate studies and projects - achieved
Know – how implementation - performed
Favorable work conditions - created
High interest of staff due to payment - achieved
High level of knowledge of operational staff - achieved
Interest for economic situation - achieved
Availability of funds for updating - achieved

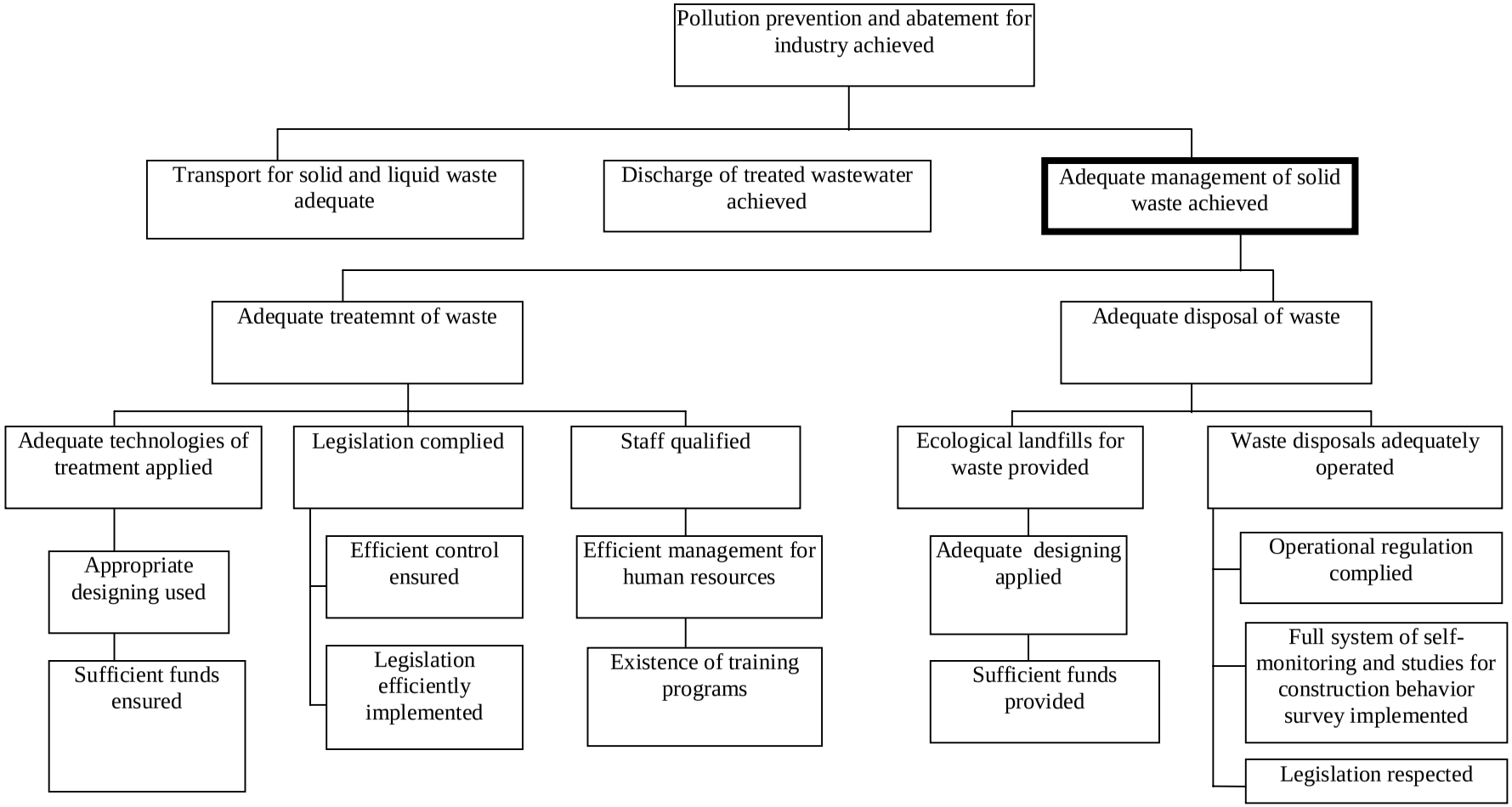

Appropriate use of water and soil resources - performed
Appropriate agricultural practices - introduced
Appropriate management of waste from animal farms - achieved
Efficient forests management - performed
Ecological farming practices and appropriate management of hydrotechnical works of the Danube Delta implemented
Exploitation principles according to the civil code - complied
Ownership regime consolidation - fulfilled
Optimization of the ecological equilibrium-profit - achieved
Public information concerning the negative effects of intensive agriculture and pisciculture - achieved
Information and training system for the ownership - implemented

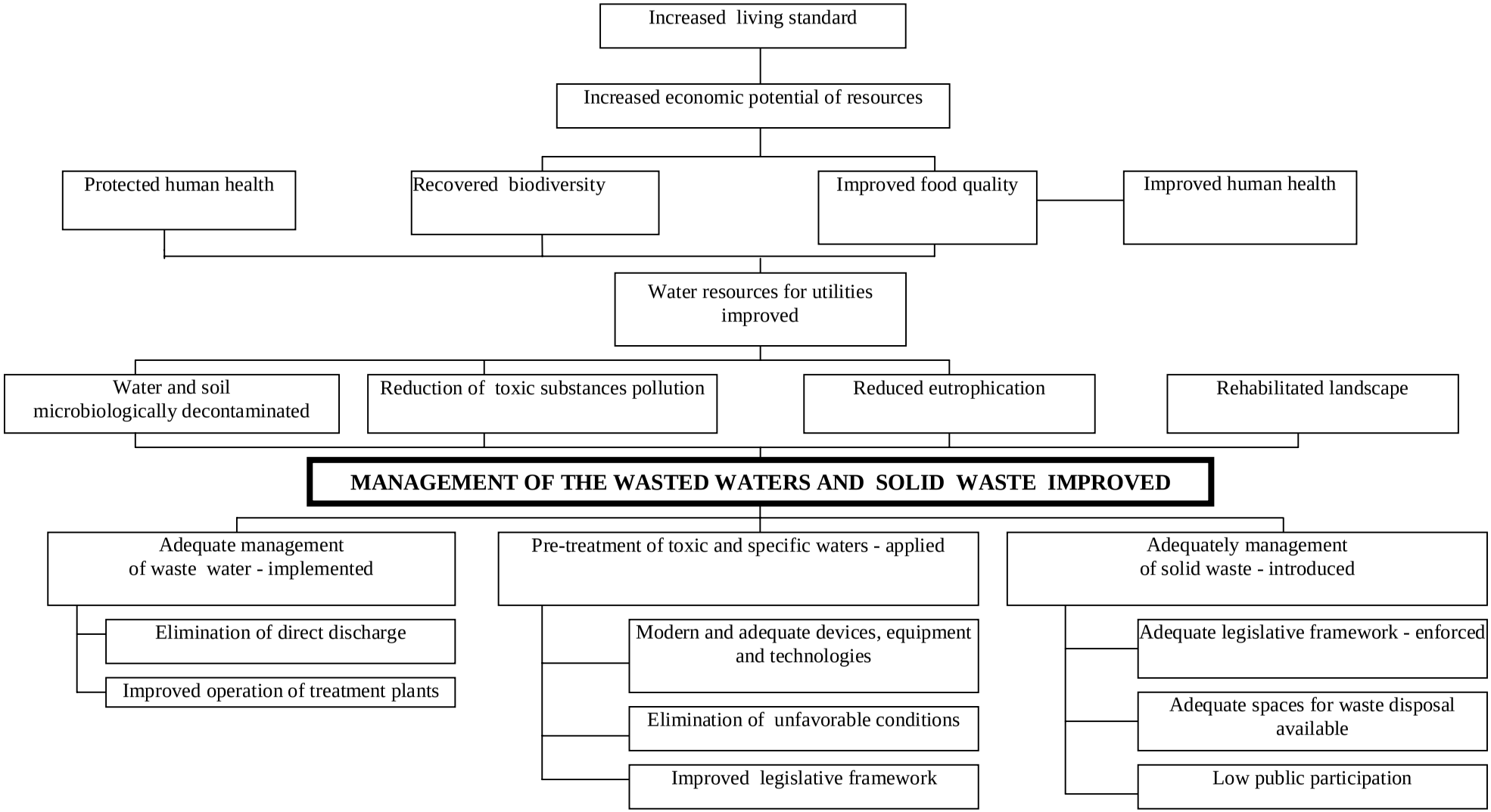

Appropriate use of water and soil resources - performed
Appropriate agricultural practices - introduced
Appropriate management of waste from animal farms - achieved
Efficient forests management - performed
Ecological farming practices and appropriate management of hydrotechnical works of the Danube Delta implemented
Hydrological regime in the Danube Delta and upstream the Delta optimized
Appropriate exploitation of the natural resources achieved
Management of the hydrotechnical works with negative effects improved
Appropriate exploitation of hydrotechnical constructions - performed
Appropriate intensive fish farming in Delta - performed
Rational management of reed in the Danube Delta - achieved
Traditional agriculture - achieved
Rational extension of channels for access to natural resources - achieved
Rehabilitation of artificial fishery basins in the Danube Delta - performed
Adequate ecological land policy - achieved
Appropriate construction of embankment and drainage works in wet areas - achieved
Public information - achieved
Optimization of ecological balance/profit relation - achieved

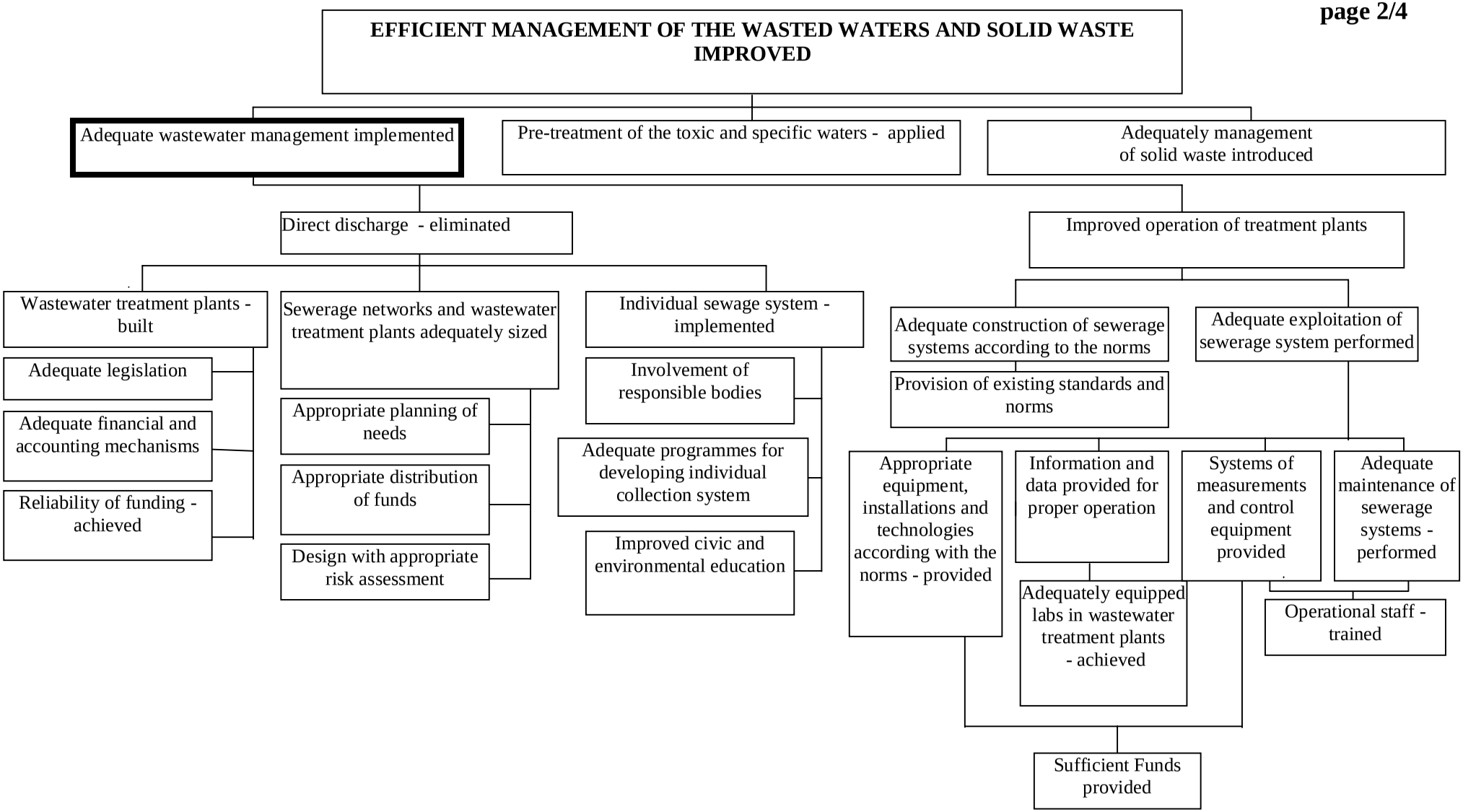

Increase of working capacity
Increase of life expectancy
Increase of birth rate
Avoidance of Genetic mutations
Stabilization of native location population
Keeping the state of natural resources
Maintaining of species biodiversity
Costs stability
Avoidance of population migration
Human health positive conditions
Rational load of environment receiving capacities
Maintaining the species number
Conserving the biodiversity
Increasing the tourist potential
Avoidance of Ecological catastrophes
Maintaining the ecosystem equilibrium
Landscape conservation
Ground and surface water quality conservation
Soil and subsoil quality conservation
Maintaining air quality
POLLUTION PREVENTION AND ABATEMENT FOR INDUSTRY ACHIEVED
Transport for solid and liquid waste adequate
Discharge of treated wastewater achieved
Adequate management of solid waste achieved
Transport system reliability improved
Level qualification of the staff increased
Studies, prognoses and alarm exercises performed
Monitoring system for transport implemented
Discharge of wastewater that are properly treated
Discharge pre treated wastewater achieved
Adequate treatemnt of waste
Adequate disposal of waste

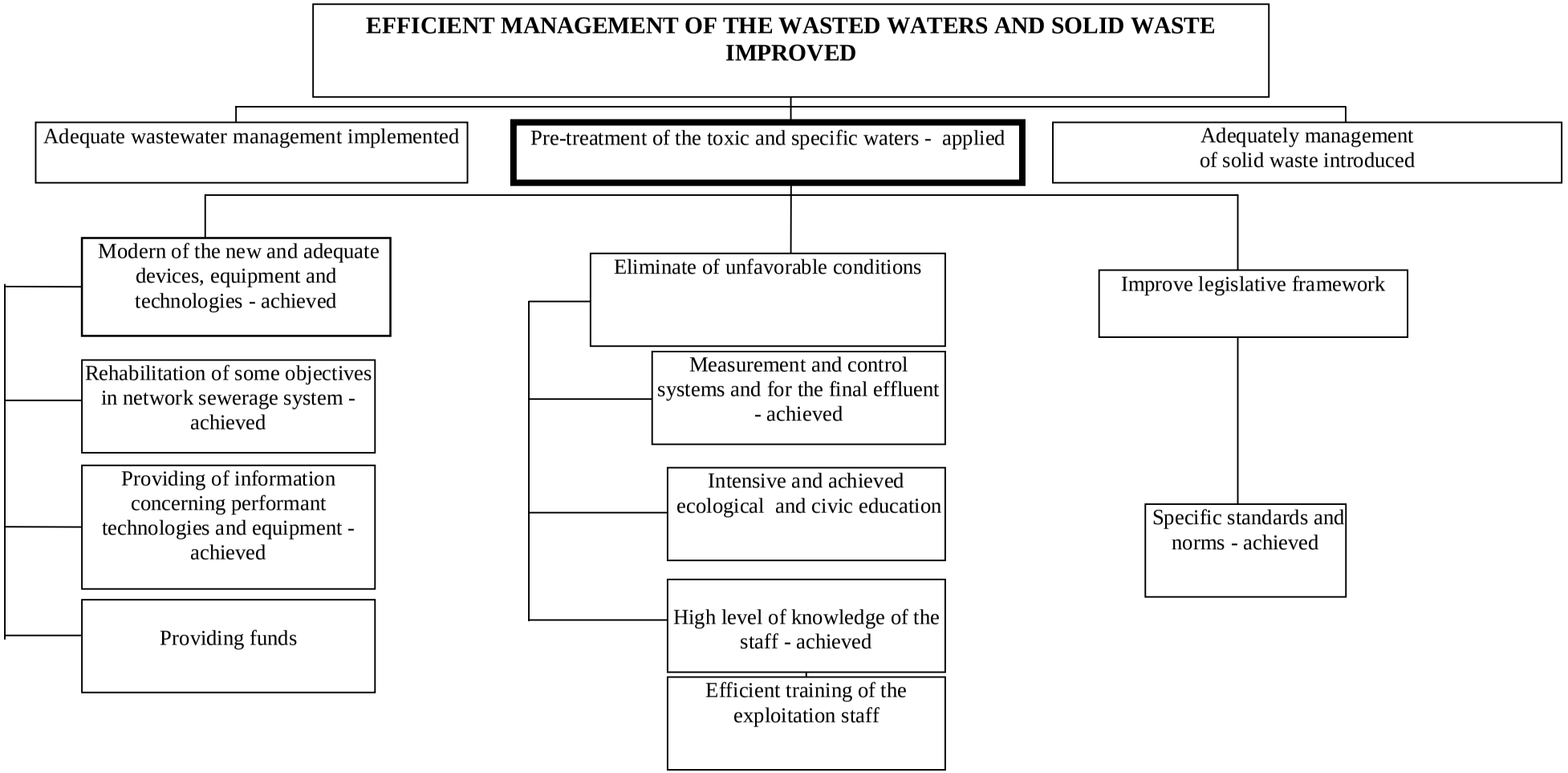

Pollution prevention and abatement for industry achieved
Transport for solid and liquid waste adequate
Discharge of treated wastewater achieved
Adequate management of solid waste achieved
Transport system reliability improved
Level qualification of the staff increased
Studies, prognoses and alarm exercises performed
Monitoring system for transport implemented
Network distribution improved
Management improvement in RU
Transport system adequately utilized
Sufficient funds for exploitation and development of the transport system provided
Training programme introduced
Ecological education applied
Expenses in tariffs evidenced
Constructing technologies respected

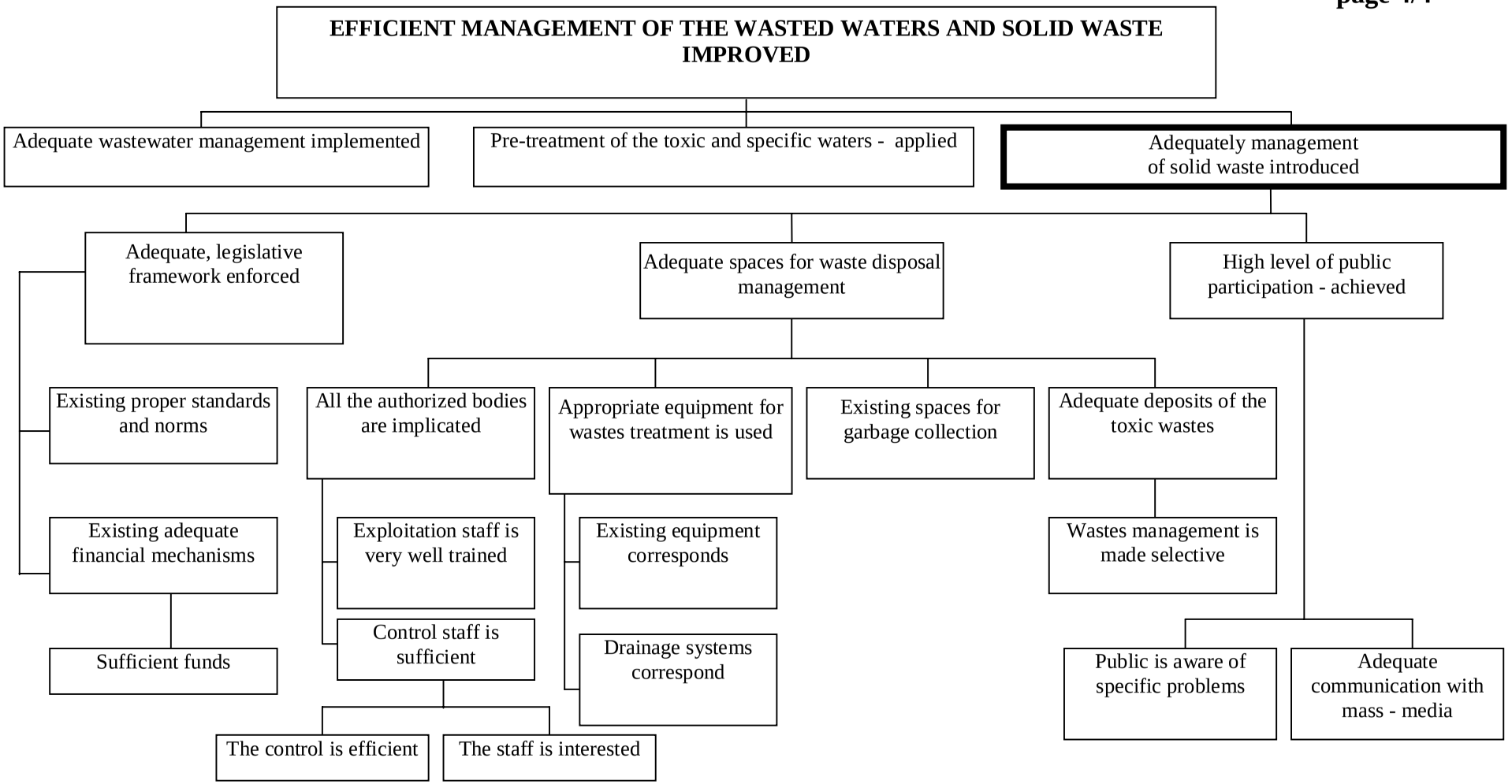

Pollution prevention and abatement for industry achieved
Transport for solid and liquid waste adequate
Discharge of treated wastewater achieved
Adequate management of solid waste achieved
Discharge of wastewater that are properly treated
Discharge pre treated wastewater achieved
Performant and clean technologies and equipment implemented
Pre-treatment plants constructed
Installations for wastewater treatment adequately operated
Regulation for ship equipping with the systems and installations for liquid waste collection elaborated
Treatment plants constructed
Compliance with legislation achieved
Technical and economic evaluation applied
Elaboration of procedures and methodologies (including standards for specific pre-treatment
Funds provided
Discipline in operation complied
Funds for efficient technologies provided
Funds for pretreatment plants provided ?
Legislation applied
Compliance with the provisions from regulations
Survey and control system along technological chain created
Staff for operation of treatment plant qualified
Control system for water quality of final effluent and sludge as well as the necessary feedback created
Treatment plants appropriately sized
Staff training provided
Public informed
Funds for reequipment of the treatment plants provided


Pollution prevention and abatement for industry achieved
Transport for solid and liquid waste adequate
Discharge of treated wastewater achieved
Adequate management of solid waste achieved
Adequate treatemnt of waste
Adequate disposal of waste
Adequate technologies of treatment applied
Legislation complied
Staff qualified
Ecological landfills for waste provided
Waste disposals adequately operated
Appropriate designing used
Efficient control ensured
Efficient management for human resources
Adequate designing applied
Operational regulation complied
Sufficient funds ensured
Legislation efficiently implemented
Existence of training programs
Sufficient funds provided
Full system of self-monitoring and studies for construction behavior survey implemented
Legislation respected


Increased living standard
Increased economic potential of resources
Protected human health
Recovered biodiversity
Improved food quality
Improved human health
Water resources for utilities improved
Water and soil microbiologically decontaminated
Reduction of toxic substances pollution
Reduced eutrophication
Rehabilitated landscape
MANAGEMENT OF THE WASTED WATERS AND SOLID WASTE IMPROVED
Adequate management of waste water - implemented
Elimination of direct discharge
Improved operation of treatment plants
Pre-treatment of toxic and specific waters - applied
Modern and adequate devices, equipment and technologies
Elimination of unfavorable conditions
Improved legislative framework
Adequately management of solid waste - introduced
Adequate legislative framework - enforced
Adequate spaces for waste disposal available
Low public participation


EFFICIENT MANAGEMENT OF THE WASTED WATERS AND SOLID WASTE IMPROVED
Adequate wastewater management implemented
Pre-treatment of the toxic and specific waters - applied
Adequately management of solid waste introduced
Direct discharge - eliminated
Improved operation of treatment plants
Wastewater treatment plants - built
Adequate legislation
Adequate financial and accounting mechanisms
Reliability of funding - achieved
Sewerage networks and wastewater treatment plants adequately sized
Appropriate planning of needs
Appropriate distribution of funds
Design with appropriate risk assessment
Individual sewage system - implemented
Involvement of responsible bodies
Adequate programmes for developing individual collection system
Improved civic and environmental education
Adequate construction of sewerage systems according to the norms
Provision of existing standards and norms
Adequate exploitation of sewerage system performed
Appropriate equipment, installations and technologies according with the norms - provided
Information and data provided for proper operation
Systems of measurements and control equipment provided
Adequate maintenance of sewerage systems - performed
Adequately equipped labs in wastewater treatment plants - achieved
Operational staff - trained
Sufficient Funds provided


EFFICIENT MANAGEMENT OF THE WASTED WATERS AND SOLID WASTE IMPROVED
Adequate wastewater management implemented
Pre-treatment of the toxic and specific waters - applied
Adequately management of solid waste introduced
Modern of the new and adequate devices, equipment and technologies - achieved
Rehabilitation of some objectives in network sewerage system - achieved
Providing of information concerning performant technologies and equipment - achieved
Providing funds
Eliminate of unfavorable conditions
Measurement and control systems and for the final effluent - achieved
Intensive and achieved ecological and civic education
High level of knowledge of the staff - achieved
Efficient training of the exploitation staff
Improve legislative framework
Specific standards and norms - achieved


EFFICIENT MANAGEMENT OF THE WASTED WATERS AND SOLID WASTE IMPROVED
Adequate wastewater management implemented
Pre-treatment of the toxic and specific waters - applied
Adequately management of solid waste introduced
Adequate, legislative framework enforced
Adequate spaces for waste disposal management
High level of public participation - achieved
Existing proper standards and norms
Existing adequate financial mechanisms
Sufficient funds
All the authorized bodies are implicated
Exploitation staff is very well trained
Control staff is sufficient
The control is efficient
The staff is interested
Appropriate equipment for wastes treatment is used
Existing equipment corresponds
Drainage systems correspond
Existing spaces for garbage collection
Adequate deposits of the toxic wastes
Wastes management is made selective
Public is aware of specific problems
Adequate communication with mass - media

Annex 5. Sector Planning Matrix

5.1. Agriculture and Land Use

5.2. Industrial Waste Management

5.3. Municipal Waste Management

Sector Planning Matrix — 1. Agriculture and Land Use — Annex 5.1.

Summary of Objectives and Activities	Impact Indicators	Important Assumptions
➢ **Program Objective:** Pollution reduction in the Romanian catchment of the Danube river	➢ (PO)	
➢ **Sector Objective:** Appropriate use of the water and soil resources performed	➢) Ecological reconstruction of wetlands according to "RAMSAR" convention by 3% the bad agricultural land in Danube flood plains, until 2003 (SO-ALU)	➢ The economical conditions are favorable (SO-ALU) ➢ Financial resources are provided (SO-ALU)
➢ **Results/Outputs:** 1.1 Appropriate agricultural practices introduced 1.2 Appropriate management of the animal waste from animal farms achieved 1.3 Efficient management of the forests performed 1.4 Ecological farming practices and appropriate management of the hydro-technic works implemented	➢ 1.1 Reduction of nutrients in water by efficient appliance of adequate agricultural practices in accordance with E.U. standards, thus increasing agricultural production by 10% till 2003 in the Danube flood areas ➢ 1.2 Reduction of water eutrophication in 30% of the surface waters adjacent to farms, including the Prut river, downstream "COMTOM" discharge, until 2001	➢ Further implementation of correct agricultural policies already established (1.1) ➢ Sufficient funds for updating (reengineering) wastewater treatment plants provided (1.2) ➢ Optimal profit/ecological balance ratio achieved (1.3) ➢ Optimal profit/ ecological balance ratio in Danube Delta achieved (1.4)
➢ **Activities:** 1.1.1 Provide appropriate technical and technological means 1.1.2 Create favorable economic environment 1.1.3 Achieve a high level of farmers' information and qualification 1.2.1 Ensure optimal sanitary conditions in animal farms 1.2.2 Perform an efficient wastewaters treatment 1.3.1 Observe the forest harvesting principles according to the forestry code 1.3.2 Achieve stability of the ownership patterns 1.4.1 Reach a balanced hydrological regime in the Danube Delta & upstream 1.4.2 Use the resources in the Danube Delta in an ecological way 1.4.3 Manage in an appropriate way the hydrotechnical works that produced negative effects	➢ 1.3 Reduction of soil erosion in forest areas by 50%, thus extending the yearly afforested area by 10% up to 2008 in comparison with 1998 ➢ 1.4 Extension of ecologically reconstructed area by 10000 ha while preserving the traditional activities, up to 2001, in the Danube Delta biosphere reserve	➢ Sufficient budgetary resources provided ➢ Actual use of modern wastewater treatment technologies ➢ Sufficient financial resources for training provided ➢ Ecological land policy in Danube Delta applied ➢ Public awareness ensured ➢ Monitoring implementation insured

PO - Program Objective SO-ALU - Sector Objective of Agriculture and Land Use

Sector Planning Matrix — 2. Industrial Waste Management — Annex 5.2.

Summary of Objectives and Activities	Indicators	Important Assumptions
➢ **Program Objective:**		
➢ **Sector Objective:** Pollution prevention and abatement for industry achieved	➢ 80% of industrial enterprises complying with the environmental requirements achieve EU standard environmental quality by the year 2005 while maintaining the level of industrial production of 1998 without loosing economic competitiveness. (SOIWM)	➢ Sustainable environmental economic policies at governmental level is supported and promoted (SOIWM)
➢ **Results/Outputs:** 2.1 Clean technologies implemented 2.2 Discharge of standard quality treated wastewaters ensured 2.3 Proper management of solid waste management adopted 2.4 Wastes transport adequately performed	➢ 2.1 Reduction by at least 15% of water consumption in the chemical industry while preserving the production level as well as the products quality of 1998, until 2005 ➢ 2.2 Reduction of heavy metal content in the wastewaters discharged by industrial units, below 0.2 mg/l (Pb), (Zn) 0.5 mg/l, 0.1 mg/l (Cu), while preserving the production level as well as the products quality as they were in 1998, in the Cris River Basin , until 2005	➢ Attracting funds from multiple sources available on time (2.1 – 2.4) ➢ Ecological awareness effectively increased (2.1 – 2.4)
➢ **Activities:** 2.1.1 Introduce the legal and economic framework for implementation of clean technologies 2.1.2 Promote incentives for BAT and multiple financing resources identified 2.1.3 Undertake measures to minimize losses in the existing installations 2.2.1 Promote construction of new WWTP and rehabilitation of existing plants 2.2.2 Ensure proper operation of treatment plants 2.2.3 Undertake measures for discharge of properly treated wastewaters 2.3.1 Use adequate processes for solid waste treatment 2.3.2 Assure adequate disposal of solid wastes 2.4.1 Improve reliability of the waste transport system 2.4.2 Upgrade the qualification level of the staff	➢ 2.2 Reduction of phenols and oil products discharged by the petro-chemical units Petrobrazi Si Arpechim down to 0.05 mg/l (Ph) and 1 mg/l (oil product), while preserving the production level as it was in 1998, in the Prahova Si Arges River Basins, until 2005 ➢ 2.3 Reduction of Hg impurification of ground waters below 0.01 mg/l if constructing insulated land fills and / or incinerators for toxic waste by Oltchim Rm. Valcea (the Olt River Basin), until 2005 ➢ 2.4 Reduction of oil products content in the polluted soils down to the limits allowed by the current enforced regulation , while recovering 30% of affected areas and putting them back into economic use, in the Prahova and Barcau River Basins, until 2007	➢ Operation discipline respected (2.1.2, 2.1.3, 2.2, 2.3.1, 2.3.2, 2.4.2) ➢ Clean technology is an advantage for industry (2.1.1 – 21.3)

PO - Program Objective SOIWM - Sector Objective Industrial Waste Management

Sector Planning Matrix — 3. Municipal Waste Management — Annex 5.3.

Summary of Objectives and Activities	Indicators	Important Assumptions
➢ **Program Objective:**		➢ …. (PO) ➢ Financial international cooperation
➢ **Sector Objective:** Management of wastewater & solid waste improved	➢ Increasing water quality in Romanian rivers by 15% from: degraded (D) – 3rd ; by 10% from 3rd – 2nd; 5% by 2nd – 1st according to Romanian standard 4706 / 1988 between 1998 - 2010	➢ Inter – regional political cooperation is developed (SO-MWM) ➢ Sustainable behavior of population is achieved (SO-MWM)
➢ **Results/Outputs:** 3.1 Adequate management of wastewater adopted 3.2 Pre – treatment of toxic & specific waters performed 3.3 Proper management of solid waste implemented	➢ 3.1 About 12 % of the population (children from rural area) are not to be exposed to the health risks caused by nitrates concentration of ground water over 45 mg / l by year of 2010. ➢ 3.1 In the period 1998 – 2010 in the 11 Romanian hydrological basins, 270 wastewater treatment plants will reduce organic & nutrients load by 20% pursuant to N.T.P.A. 001 & agreements in force	➢ Priority of environmental protection within the government policies ➢ Cooperation among all stakeholders ➢ Supportive economic conditions
➢ **Activities:** 3.1.1 Eliminate direct discharge of wastewater 3.1.2 Improve operation of existing treatment plants 3.1.3 Ensure proper individual wastewater treatment 3.2.1 Undertake measures for construction of new pre – treatment plants, upgrading (rehabilitation operation) of the existing ones 3.2.2 Reinforce control and measurement activities 3.2.3 Create favorable framework conditions (legislation and environmental education) 3.3.1 Implement selective wastes collection 3.3.2 Undertake measures to facilitate solid waste management optimization 3.3.3 Ensure the use of proper solid waste disposal facilities	➢ 3.2 In 270 localities from 11 hydrological basins approx. 6000 economic agents will reduce polluting substances discharges (heavy metals, grease oil, petroleum, etc) under the limit provided by N.T.P.A. until 2010 ➢ 3.3 In the 11 Romanian hydrological basins, 256 towns with population over 20000 inhabitants will reduce the inadequate wastes disposal sites by 50% and will reintroduce the recovered land in the socio – economic circuit by 2010	➢ Provision of funds on time (3.1.1 , 3.1.2 , 3.2.1 , 3.3.3) ➢ Operational financial mechanisms (3.3.2) ➢ Effective and differentiated attractive taxation and tariffs policies implemented ➢ Adjustment of pre – treatment technology while the activity profile is being changed available on time (3.2.1) ➢ Development of fund raising policies

PO - Program Objective SOM - Sector Objective Municipality

Annex 6. Activities, Important Elements and Projects

6.1. Agriculture and Land Use

6.2. Industrial Waste Management

6.3. Municipal Waste Management

RESULT 1.1.: Appropriate agricultural practices - introduced

Activities	Important Elements	Projects		
		Existing	**In Preparation**	**Proposed**
➢ 1.1.1 Provide appropriate technical and technological means	➢ Promote coherent agricultural policies ➢ Use of appropriate machinery ➢ Land organization – introduced ➢ Provide and implement specialized projects (pastures, land reclamation) ➢ Ecological reconstruction of affected areas – facilitate ➢ Develop financial support mechanisms for ecological farming ➢ Promote modern technologies for crops (high yielding varieties) ➢ Farming in association - favored	➢ Ecological reconstruction of Zlatna area (Mures river basin) ➢ Rapid data collection by satellite for dangerous hydro-meteo phenomena ➢ Model farms of ecological agriculture	➢ Reclamation technologies of agricultural soils affected by oil and salted water pollution in river tributary basin : Crisul Alb, Crisul Repede, Olt, Arges, Ialomita, Siret ➢ Ecological reconstruction of agricultural soils – Baia Mare ➢ Ecological reconstruction of poor agricultural land in Romanian Danube river basin ➢ Development of a monitoring system for chemical soil pollution in agricultural areas in Romanian Danube river basin ➢ Monitoring of protected areas in Romanian Danube river basin ➢ Development of rapid dissemination of information regarding flood propagation in Romanian Danube river basin ➢ Dams rehabilitation along side Danube river from Iron Gate km. 875 to Isaccea km.103 ➢ Consolidation and rehabilitation of sliding lands in Zalau city (Somes river basin) ➢ Inventory of areas under risk of landslides ➢ Rehabilitation of irrigation and drainage systems in the Danube flood areas	➢ Study on ecological reconstruction by controlled flooding of embanked areas in Jijia river meadow ➢ Study regarding sizing the protection area in relation with the use of chemicals in the river meadows ➢ Identification of control ecosystem areas and their preservation ➢ Standard projects on ecological and land use monitoring ➢ Setup of thin protective forests in the dam-riverside area (Danube flood plain) ➢ Ecological reconstruction of the Greaca lake in the Danube flood plain (Giurgiu and Calarasi counties) ➢ Study on the size of fauna population in agriculture ecosystems

RESULT 1.1.: Appropriate agricultural practices – introduced

Activities	Important Elements	Projects		
		Existing	**In Preparation**	**Proposed**
➢ 1.1.2 Create Provide favorable economic environment	➢ Achieve stability of ownership patterns ➢ Improve infrastructure in rural area ➢ Provide financial facilities for environmental investment ➢ Develop agro-tourism and ecological tourism ➢ Control efficiently application of legislation ➢ Improve comfort and civilization degree in rural areas ➢ Setup of market mechanisms ➢ Provide facilities for less favored rural areas	➢ Legislative initiatives (exemption from taxes on profit, land, etc…) ➢ Amendments to Land Law	➢ Specific legislation for less – favored areas	
➢ 1.1.3 Achieve a high level of farmers' information and qualification	➢ Introduce an efficient and accessible information system ➢ Organize ecological promotion actions to increase awareness of young people in rural areas ➢ Setup again rural management schools ➢ Reconsider local tradition & cultural elements ➢ Educate & inform farmers about ecological agricultural practices ➢ Train operational staff ➢ Attract high skilled technical staff to rural areas by eliminating rural/urban disparities	➢ Training and extension programmes		➢ General business plans for farmers ➢ Farmers' guides for different activities

RESULT 1.2.: Appropriate management of the animal waste from animal farms - achieved

Activities	Important Elements	Projects		
		Existing	In Preparation	Proposed
➢ 1.2.1 Ensure optimal sanitary conditions in animal farms	➢ Develop policies in line with local requirements and market considerations ➢ Inventory of immediate needs ➢ Split the huge pig farms into smaller units ➢ Observe environmental legislation ➢ Provide necessary financial resources for constructing new wastewater treatment plants ➢ Provide incentives as well as applying coercitive regulations ➢ Promote construction of animal wastewater treatment plants considering capacity optimization	➢		➢ Feasibility study regarding splitting the huge pig farms into smaller units
➢ 1.2.2 Perform an efficient wastewaters treatment	➢ Update and rehabilitate the existing wastewater treatment plants ➢ Introduce modern wastewater treatment technologies ➢ Promote a modern animal husbandry practices (low water consumption) ➢ Operate and manage in an appropriate way the wastewater treatment plants ➢ Facilitate skilled operational staff ➢ Ensure efficient monitoring and control system	➢ Capacity increase of wastewater treatment plant of COMTOM Tomesti (Prut river basin) ➢ Spreading in the fields the solid waste resulting from wastewater treatment plants (experimental) ➢ Irrigation with wastewater (experiments) in Peris and Crevedia ➢ Orientation of agriculture to a rational use of animal waste (Peris)	➢ Recycling and management of animal waste from animal farms (Romanian Danube river basin) ➢ Capacity increase of wastewater treatment plant of COMTOM Tomesti (Prut river basin)	➢ Use of zeolytes in wastewater

RESULT 1.3.: Efficient management of the forests - performed

Activities	Important Elements	Projects		
		Existing	In Preparation	Proposed
➢ 1.3.1 Observe the forest harvesting principles according to the forestry code	➢ Correlate wood cutting volume with growth ratio ➢ Monitor forest harvesting ➢ Comply with the wood cutting regime, mainly by private owners ➢ Control of woodcutting on slopes ➢ Afforestation of excessively degraded lands or with low agricultural potential ➢ Optimize the profit ecological effect ratio ➢ Setup of an efficient training system for private owners	➢ Afforestation of Copsa Mica area	➢ Development and extension of forestry ecosystem monitoring ➢ Control soil erosion in Tazlau river basin	➢ Identification of degraded pastures
➢ 1.3.2 Achieve stability of the ownership patterns	➢ Complete the issue of ownership titles ➢ Setup of land market ➢ Promote fiscal facilities for landowners			➢ Inventory of degraded areas resulting from irrational forest harvesting ➢ Soil erosion control measures in Subcarpathian areas ➢ Issuing the laws regulating the land market ➢

RESULT 1.4.: Ecological farming practices and appropriate management of the hydrotechnic works - implemented

Activities	Important Elements	Projects		
		Existing	**In Preparation**	**Proposed**
➢ 1.4.1 Reach a balanced hydrological regime in the Danube Delta & upstream	➢ Reduce arable in the large farms in the Danube Delta ➢ Close the artificial channels which modified the hydrological regime in Danube Delta ➢ Calibrate channels in Danube Delta ➢ Unsilt some lakes and channels in the Danube Delta	➢ Consolidation of the sea shore line of the Danube Delta Biosphere Reserve ➢ Improvement of ecological conditions for water circulation in the complex Matita – Merhei in the Danube Delta Biosphere Reserve ➢ Unsilting and calibration of Sontea, Radacinasi, Perivolovca, Litcov channels in the Danube Delta Biosphere Reserve	➢ Reclamation technologies of agricultural soils affected by oil and salted water pollution in tributary basin : Black Sea ➢ Development of ecological database using GIS (Romanian Danube river basin) ➢ Inventory of flooding areas	➢ Bathimetric and streams study in the Danube Delta ➢ Identification and calibration of artificial channels that modified the hydrological regime in the Danube Delta Biosphere Reserve ➢ Ecological reconstruction through measures regulating the hydrological regime of the Danube Delta ➢ Impact study regarding the influence of sea coast dykes upon natural ecosystem in the Danube Delta
➢ 1.4.2 Use the resources in the Danube Delta in an ecological way	➢ Forbid use of pesticides in the Danube Delta ➢ Reconstruct ecologically the affected by embankments in the Danube Delta ➢ Perform eco-tourism in the Danube Delta ➢ Perform traditional farming for satisfying local needs ➢ Complete the list of species protected by the law	➢ Adequate management of reed resources in the Danube Delta Biosphere Reserve ➢ Protection and maintenance of species populations highly valuable in the Danube Delta Biosphere Reserve ➢ Identification maintenance and protection of spawning areas for different fish species in the Danube Delta Biosphere Reserve	➢ Protected areas monitoring in the Danube Delta Biosphere Reserve ➢ Improvement of environmental quality monitoring in the Danube Delta Biosphere Reserve, integrated in the national system ➢ Promotion of traditional farming in the framework of sustainable development ➢ Identification of the sources polluting Danube waters in the Danube Delta Biosphere Reserve	➢ Identification of some areas from agricultural polders for ecological reconstruction in the Danube Delta Biosphere Reserve ➢ Study on efficient agrotourism performance in the Danube Delta Biosphere Reserve ➢ Rehabilitation of traditional areas for willow species in the Danube Delta Biosphere Reserve ➢ Elaboration and implementation of strategies for ecological reconstruction in fishing polders in the Danube Delta Biosphere Reserve ➢ Analysis of opportunities for extending prohibition periods for endangered fish species

RESULT 1.4.: Ecological farming practices and appropriate management of the hydrotechnic works - implemented

Activities	Important Elements	Projects		
		Existing	In Preparation	Proposed
➢ ➢1.4.3 Manage in an appropriate way the hydrotechnical works that produced negative effects	➢ Improve the operation of hydrotechnical works in the Danube Delta ➢ Implement non structural measures in order to reduce the present negative effects ➢ Dismantle hydrotechnical works that produced acute effects	➢ Management objective for bio-diversity conservation and sustainable development in the Danube Delta Biosphere Reserve ➢ Setup of a management system for sustainable use in the Danube Delta Biosphere Reserve ➢ Development and improvement of monitoring systems of tourist activity in the Danube Delta Biosphere Reserve	➢ Research on the dynamics and functioning of the natural ecosystem in the Danube Delta Biosphere Reserve ➢ Identification of lake areas and undisturbed fishery basins in the Danube Delta Biosphere Reserve ➢ Development of cooperation with international bodies for implementation of the objectives in the management plan of the Danube Delta Biosphere Reserve	➢ Develop basic hydraulic model of the Delta which simulates observed changes in water levels and flood areas ➢ Study on identification and implementation of non –structural measures in the Danube Delta ➢ Study regarding the effects produced by the hydrotechnical works in the Danube Delta

RESULT 2.1.: Clean technologies implemented

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 2.1.1. Introduce the legal and economic framework for implementation of clean technologies	➢ Elaboration of strategies and policies to promote clean technologies ➢ Promote legal norms according to the EU regulations ➢ Identification of mechanisms to stimulate clean technologies implementation ➢ Ensure stimulation of companies through economic instruments (taxes, charges, tariffs)		➢ Introduction of new economic and financial instruments ➢ Legislative harmonization Aquis Communautaire	➢ Supporting economic operators for ISO 14001 Certification ➢ Development of institutional framework for implementation
➢ 2.1.2 Promote incentives for BAT and multiple financing resources identified	➢ Creation of an institutional framework to promote and sustain clean technologies ➢ Elaboration of governmental programs and setting up of funds for know how transfer ➢ Provision of financing sources ➢ Ensure know-how transfer and control of BAT levels ➢ Creation of centers to promote clean technologies		➢ Creation of “clean” technologies centers	➢ Network for the “clean” technologies centers
➢ 2.1.3 Undertake measures to minimize losses at the existing installations	➢ Elaboration of guidelines for wastes minimization solutions ➢ Provision of human and financial resources ➢ Elaboration and implementation of methods for effects evaluation ➢ Creation of databases centers with updated information	➢ Modernizing the equipment in Letea Bachu ➢ Modernizing the equipment in Siderca Calarasi ➢ Modernizing the equipment in Petrobrazi ➢ Modernizing the equipment in Arpechim	➢ Applying more ecological processes in Manper Tg Mures ➢ Applying more ecological processes in UPS Govora ➢ Applying more ecological processes in the Technological flow in Sinteza Oradea	

RESULT 2.2.: Discharge of standard quality treated wastewaters ensured

Activities	Important Elements	Projects		
		Existing / On-going	Planned	Proposed
➢ 2.2.1. Promote construction of new WWTP and rehabilitation of existing plants	➢ Technical, economical and social evaluation of studies, projects and prognoses of development ➢ Estimation of the treatment needs for the foreseen wastewater quantity and quality ➢ Criteria setting up requirements and prioritization ➢ Estimation of the necessary resources (funds, human resources etc.) ➢ Elaboration of projects on specific industries ➢ Promotion of projects in terms of technical and financial support ➢ Implementation of projects			➢ Completion and achievement of all optimum operational parameters of wastewater treatment plants ant the economic agents
➢ 2.2.2. Ensure proper operation of treatment plants	➢ Elaboration of operation norms ➢ Monitoring of influents and effluents within the treatment process ➢ Provide the necessary qualified personnel ➢ Make funds available for maintenance and operation of WWTP ➢ Develop emergency procedures	➢ Modernizing Colorom Codlea wastewater treatment plant (WWTP) ➢ Rehabilitation of Antibiotice Iasi WWTP ➢ Modernization Siderca Calarasi WWTP ➢ Rehabilitation of Arpechim WWTP ➢ Rehabilitation of Petrobrazi WWTP	➢ Modernization of Celohart Donaris Braila wastewater treatment plant ➢ Modernization of Cluj-Napoca Clujana WWTP ➢ Modernization of Vidra Orastie WWTP	
➢ 2.2.3 Undertake measures for discharge of properly treated wastewaters	➢ Assure application of emergency procedures through providing of emergency means ➢ Assure implementation of inspection program by the authorities ➢ Implementation of control program carried out by the operator			➢ Completion and achievement of all optimum operational parameters of wastewater treatment plants ant the economic agents

RESULT 2.3.: Proper management of solid waste management adopted

Activities	Important Elements	Projects		
		Existing	**Planned**	**Proposed**
➢ 2.3.1 Use adequate processes for solid waste treatment	➢ Introduce the legislative framework ➢ Elaboration of rules for operation ➢ Assure proper application of treatment technologies ➢ Support availability financial and human resources ➢ Assure monitoring of treatment technologies ➢ Enforce the control and inspection programmes	➢ Improvement of the toxic waste management Petrotel Lukoil ➢ Functioning of an incinerator for toxic waste Oltchim RV	➢ Action program in the oil sector (emergency case)	
➢ 2.3.2. Assure adequate disposal of solid wastes	➢ Introduce the legislative framework ➢ Implementation of related regulation according to the general urban plan ➢ Elaboration of methods for solid wastes disposal ➢ Make available financial and human resources ➢ Assure monitoring of landfills ➢ Ecological education and public participation ➢ Enforce control and inspection programs	➢ Sealing of phosphorus-gypsum pond Fertilchem Navodari ➢ Sealing of phosphorus-gypsum pond Sofert Bacau	➢ Application of more ecological disposal of slage and ashes Conel CET ➢ Application of more ecological disposal of sludge and ashes Sidex Galaty	➢ Rehabilitation and reintroduction in the economic circuit of the Abandoned industrial areas

RESULT 2.4.: Wastes transport adequately performed

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 2.4.1. Improve reliability of the waste transport system	➢ Evaluation of existing systems ➢ Estimation of requirements and quantities ➢ Make available financial and human resources ➢ Facilitate modernization of transport system ➢ Internalize the rehabilitation costs in the price system ➢ Monitoring control and inspection	➢ Providing of safe transport of effluent in Verachim Giurgiu ➢ Rehabilitation of wastewater transport network in Romplumb ➢ Rehabilitation of wastewater transport network in Phoenix ➢ Development of self monitoring system	➢ Construction and modernization of wastewater treatment plant for intaking of solid and liquid wastes from river ships ➢ Improvement of hydraulic transport of wastes coming from CET ➢ Purification of soil and ground water in Plojesti	➢ Rehabilitation of networks for hazardous wastes transport
➢ 2.4.2. Upgrade the qualification level of the staff	➢ Introduce optimal human resources management ➢ Elaboration and implementation of permanent raining / education program ➢ Implementation of a mechanisms of incentives for the staff			➢ Creation of instruction and qualification centers ➢ Assistance given to the economic enterprises in order to identify the methods of risk assessment

RESULT 3.1.: Adequate management of wastewater adopted

Activities	Important Elements	Projects		
		Existing	In Preparation	Proposed
➢ 3.1.1 Eliminate direct discharge of wastewater	➢ Determine through pre – feasibility studies the opportunity to invest in construction of new treatment plants ➢ Setting up the technical norms to design & operate treatment plants ➢ Development & appliance of & more efficient (tertiary) treatment methods for specific types of pollution ➢ Elaboration of new laws and implementation of legislation approximation of legislation with E.U. requirement ➢ Development & appliance of procedures for evaluating the risk for various discharges ➢ Harmonization of analysis methods and of laboratories from treatment plants with those of water management units ➢ Organization at national level of a system of providing quality in accordance with ISO 9000 – 14001 & its implementation at the units ➢ Creation & use of warning system in case of accidents ➢ Improvement of the information system for the public to have an active participation in the decision making ➢ Improvement of training & education programs ➢ Elaboration of new projects & provision of financial resources ➢ Provision of (financing) funds from internal & external sources for treatment plants where municipal discharges with transboundary impact are treated ➢ Assure the construction and operation of new treatment plants	➢ Wastewater treatment of Harsova	➢ Wastewater treatment plant in Cernavoda ➢ Wastewater treatment plant of Braila city	➢ Wastewater treatment plant of Galati city ➢ Wastewater treatment plant in Zalau ➢ Harmonization of Romanian legislation with E.U. emissions norms ➢ Wastewater treatment plant of Tulcea city

RESULT 3.1.: Adequate management of wastewater adopted

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 3.1.2 Improve operation of existing treatment plants	➢ setting up of procedures to identify malfunctions & execution errors as well as rehabilitation of deteriorated parts ➢ extension, modernization and requirement of treatment plants ➢ apply the advance treatment methods for nutrients or other specific pollutants removal ➢ perform procedures for risk evaluation for the existing treatment plants ➢ improve efficiency of plant operation by providing measuring and control equipment ➢ improve operators skills ➢ make available financing, resources for operation using coercitive and incentive measures ➢ make compatible methods of analysis use by the operators and inspection bodies ➢ creation & use of warning systems in case of accidents ➢ organization at national level of the system for providing quality in accordance with ISO 9000 – 14001 &its implementation at the units	➢ Extension of wastewater treatment plant of Mangalia ➢ Modernization & reequipment of Iasi - wastewater treatment plant ➢ Modernization of Craiova - wastewater treatment plant	➢ Pipes for discharges the treated wastewater from the Black Sea wastewater treatment plant ➢ Extension of wastewater treatment plant of Ploiesti municipality ➢ Completion of in wastewater treatment plant of Glina – Bucuresti ➢ Setting – up of objectives for water quality (identification of standards & objectives) ➢ Modernization & extension of Timisoara - wastewater treatment plant	➢ equipment for treatment plant of UPSOM – Ocna Mures ➢ Extension of treatment plant in Deva ➢ Development programs for local participating democracy ➢ Creation of a system of reference labs ➢ Development of environmental labs in transboundary areas :Timisoara, Resita, Craiova, Pitesti, Calarasi, Galati, Tulcea, Bacau, Iasi, Suceava, Baia Mare, Oradea, Arad ➢ Extension of Campu Lung Muscel wastewater treatment plant ➢ Control & intervention systems for accidental pollution ➢ Extension of Resita wastewater treatment plant

RESULT 3.1.: Adequate management of wastewater adopted

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 3.1.3 Ensure proper individual wastewater treatment	➢ Research program for development of individual treatment systems ➢ Develop and design of fiscal incentives for promotion of individual treatment systems ➢ Elaborate appropriate programs for introducing adequate individual systems ➢ Involve bodies and authorities for introducing individual wastewater treatment ➢ Raise public awareness through involvement of media regarded of the importance of household wastes ➢ Assist population concerned by introducing and using individual systems			➢ Design national programs for raising public awareness ➢ National programme for wastewater treatment and disposal in rural area ➢ Develop guidelines on individual means for wastewater treatment and disposal

RESULT 3.2.: Pre – treatment of toxic and specific waters performed

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 3.2.1 Undertake measures for construction of new pre – treatment plants, upgrading (rehabilitation operation) of the existing ones	➢ Information about existing situation in order to establish priorities ➢ Information about the state of compliance programme ➢ Information on best available technology and necessary technologies and equipment ➢ Elaboration of feasibility studies to determine necessary investments ➢ Make available funds for pre – treatment wastewater plants ➢ Establish solutions to obtain an efficient pre – treatment ➢ Use modern equipment and technologies for rehabilitation and modernization of existing pre – treatment plants ➢ Construction of pre - treatment plants ➢ Training of operational staff ➢ Elaboration of operational regulation ➢ Study of recycling possibilities			➢ Projects of feasibility studies for constructions of pre – treatment plants in the following towns: Timisoara, Resita, Craiova, Ploiesti, Iasi, Galati, Braila, Mangalia, Zalau, Bucuresti, Campulung Muscel, Deva ➢ Training programmes for operation staff ➢ Design & operation instructions for wastewater categories in treatment plants

RESULT 3.2.: Pre – treatment of toxic and specific waters performed

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 3.2.2 Reinforce control measurement activities	➢ Define proper measurement and control equipment ➢ Purchasing and installing control and measurement equipment ➢ Providing warning & intervention systems in case some dangerous quality indicators are exceeded ➢ Monitoring of effluent quality ➢ Stimulation of operation staff (payments, decent work condition, etc) ➢ Training courses for operational staff			➢ Guide of equipment consisting of the measuring & control apparatus (warning as well) for wastewater categories in pre – treatment plants
➢ 3.2.3 Create favorable framework conditions (legislation and environmental education)	➢ Identification of gaps in the existing legislation ➢ Harmonization of Romanian specific standards with those of E.U. ➢ Establish norms on wastewater quality to be discharged and on emission factors and coercitive measures ➢ Education in school, social economic units (manuals, folders, posters, etc) ➢ Provide regular information on polluters for population ➢ Facilitate involvement of public in the decision making process			➢ Elaboration of ecological education programme ➢ Code of behavior for foreign investors ➢ Harmonization of legislation on wastewater pre – treatment with E.U. provisions ➢ “Greening the curricula” NGO

RESULT 3.3.: Proper management of solid waste implemented

Activities	Important Elements	Projects		
		Existing	**Planned**	**Proposed**
➢ 3.3.1 Implement selective wastes collection ➢	➢ Situation evaluation ➢ Pre – feasibility study to determine selective collection of waste ➢ Identification of alternatives ➢ Taking measures to involve all the interested parties ➢ Provide the financing sources to archive the project ➢ Population education as regards selective collection ➢ Information of the public as regards wastes management ➢ Building – up of infrastructure	➢ Selective collection of wastes Piatra Neamt		➢ Setting – up training centers ➢ Equipment for selective management wastes ➢ Campaign for raising public awareness
➢ 3.3.2 Undertake measures to facilitate solid waste management optimization	➢ Evaluate the situation of solid waste management ➢ Introduce appropriate measures to alleviate the environmental impact of solid waste management ➢ Elaboration of procedures & regulation for legal appliance ➢ Define measures in accordance with the international legislation ➢ Develop incentives ➢ Implementation of some specific courses in the education system ➢ Enforcement of the law for wastes ➢ Provide the best economic sound measures to abate the environmental impact of the existing solid waste facilitate ➢ Facilitate experience exchange among companies ➢ Promote investment in solid waste management projects ➢ Develop financial mechanism for solid waste management	➢ Project " Center of resources " for NGO (AB)	➢ Draft (project) of law of wastes ➢ Training of community active members ➢ Setting – up offices for ecological advisers	➢ Setting – up of training centers ➢ Campaigns for raising public awareness ➢ Harmonization of wastes management legislation with the E.U. legislation

RESULT 3.3.: Proper management of solid waste implemented

Activities	Important Elements	Projects		
		Existing	Planned	Proposed
➢ 3.3.3 Ensure the use of proper solid waste disposal facilities	➢ Involved the authorities and the public ➢ Provide of financing sources ➢ Find out through evaluation field location (sites for landfills, infrastructure) ➢ Make available new equipment and reconditioning of the existing ones ➢ Improvement of staff qualification level ➢ Introduce incentives coercitive measures ➢ Efficient control of activity ➢ Ecological rehabilitation (exhausted deposits)	➢ Ecological rehabilitation of Zlatna area (AB)	➢ Creation of the environment fund	➢ Ecological reconstruction of the exhausted wastes site in Ovidiu (CT) ➢ Lab equipment for E.P.A.S. ➢ Requirement - installation for chalk in Basarabi & for kaolin in Medgidia ➢ Ecological deposit for domestic waste in the Danube river Delta ➢ Ecological landfills in Techirghiol ; Eforie; Mangalia

Annex 7. Workshop Organization

7.1. Agenda of the Workshop

7.2. List of Participants

7.3. Evaluation of the Workshop

GEF- Danube Pollution Reduction Program
National Planning Workshop
Agenda
September 30 - October 3, 1998, Constanta

Wednesday

9:30 – 10: 30	Opening speeches ➢ Opening speech – Viorel Constantin Raicu, Secretary of State, MWFEP – Water Department ➢ Speeches given by special invitees: - Marian Parjol, Prefect, Constanta county - Stelian Dutu, River-side County Councils Association - Vasile Pitu, Manager "Romanian Waters" Regie Autonome ➢ Speech given by Joachim Bendow, Programme Manager	Plenary session
10:30 – 10:45	Presentation of TOPP working method	Plenary session
10:45 – 11:00	*Coffee Break*	
11:00 - 11:30	Situation analysis in the three ecological regions ➢ Moldova ➢ Muntenia ➢ Transilvania	Plenary session
11:30 – 12:15	Situation analysis in the three ecological regions	Working groups sessions
12:15 – 13:00	Presentation of results on ecological regions	Plenary session
13:00 – 14:30	*Lunch Break*	
14:30 – 14:45	Situation analysis by sectors	Plenary session
14:45 – 16:30	Situation analysis by sectors: ➢ Actions leading to water pollution ➢ Strengths/potentialities ➢ Transboundary effects ➢ Effects upon environment ➢ Causes leading to water pollution ➢ Measures to be undertaken	Working groups sessions
16:30 – 17:00	*Coffee Break*	
17:00 – 18:30	Situation analysis by sectors	Working groups sessions
18:30 – 19:30	Presentation of results	Plenary session
20:00	*Cocktail & Dinner*	

Thursday

9:00 – 10:30	Situation analysis	Plenary session
	Presentation of results	
10:30 – 11:00	*Coffee Break*	
11:00 – 13:00	Problem analysis – problem tree	Plenary session
	Problem analysis (continuation): ➢ Causes ➢ Effects	Working groups sessions
13:00 – 14:30	*Lunch Break*	
14:30 – 16:00	Problem analysis	Plenary session
	Presentation of results	
16:00 – 16:30	*Coffee Break*	
16:30 – 18:30	Objectives analysis – objectives tree	Plenary session
	Objectives analysis	Working groups sessions
	Presentation of results	Plenary session
20:00	*Dinner*	

Friday

9:00 – 10:30	Sector planning matrix	Plenary session
	➢ Sector objectives ➢ Sector results ➢ Sector activities	Working groups sessions
10:30 – 11:00	*Coffee Break*	
11:00 – 12:30	Planning matrix (continuation)	Working groups sessions
12:30 – 14:00	*Lunch Break*	
14:00 – 15:30	Activities, important elements, projects	Plenary session
	➢ Activities ➢ Important elements ➢ Projects	Working groups sessions
15:30 – 16:00	*Coffee Break*	
16:00 – 18:30	Activities, important elements, projects (continuation) + Presentation of results	Working groups sessions Plenary session
20:00	*Special Dinner*	

Saturday

9:00 – 10:30	Important assumptions	Plenary session
		Working groups sessions
10:30 – 11:00	*Coffee Break*	
11:00 – 12:30	Impact indicators	Plenary session
		Working groups sessions
12:30 – 13:30	Presentation of sector planning matrix	Plenary session
		Working groups sessions
	Presentation of activities, important elements and projects	Plenary session
	Presentation of the Programme planning matrix	Plenary session
13:30 – 14:30	Workshop assessment; closing ceremony	Plenary session
14:30	*Lunch*	

List of Participants

No.	Name	Organization
1.	**Viorel C. Raicu**	*Ministerul Apelor Pădurilor şi Protecţiei Mediului*
		Secretar de STAT
		International Experts
2.	**Joachim Bendow**	*Danube Program Coordination Unit*
3.	**Marcella Fabianova**	*Danube Program Coordination Unit*
4.	**Maxim Belot**	*Danube Program Coordination Unit*
		National Country Coordinator
5.	**Octavian Ceachir**	*Ministerul Apelor Pãdurilor si Protecþiei Mediului*
		National Experts
6.	**Petru Serban**	*Regia Autonomă Apele Române Director*
7.	**Mihaela Popovici**	
8.	**Carmen Rosu**	*Ministerul Finantelor*
9.	**Melania Manea**	*Ministerul Apelor Pãdurilor si Protecþiei Mediului*
10.	**Liviu Popescu**	
		Translators
11.	**Camelia Serbănescu**	*Institutul de Economie Agrara*
12	**Cristina Sofron**	*Institutul de Cercetari pentru Ingineria Mediului*
		Facilitators
13	**Adriana Mircea**	*Ministerul Apelor, Padurilor si Protecţiei Mediului*
14	**Cerasela Stancu**	*The Ecologist Youth of Romania*
		Secretariat
15	**Stoicescu Emanoel**	*Ministerul Apelor, Padurilor si Protecţiei Mediului*
16	**Camelia Dumitrache**	*Regia Autonoma ‘’Apele Romane’’ - Constanta*
		Participants
17	**Florea Gabrian**	*Ministerul Apelor, Padurilor si Protecţiei Mediului*
18	**Cristina Ion**	*Ministerul Industriei si Comertului*
19	**Felicia Toader**	*Ministerul Industriei si Comertului*
20	**Cristian Gheorghe**	*Ministerul Transporturilor*
21	**Doina Moca**	*Ministerul Agriculturii*
22	**Dragan Alexandru**	*Ministerul Apelor Padurilor si Protecþiei Mediului*
23	**Mihai Manolescu**	*Regia Autonoma ‘’Apele Romane’’*

24	**Elena Teican**	*Regia Autonoma ‘’ Apele Romane’’ - Constanta*
25	**Acceleanu Nicolae**	*Agenþia de Protecþia Mediului – Tulcea*
26	**Tampos Katiusa**	*Agenþia de Protecþia Mediului – Constanta*
27	**Maxim Cristian**	*Rezervaþia ‘’Delta Dunarii’’*
28	**Lesnic Mihail**	*Institutul de Cercetari Pentru Ingineria Mediului*
29	**Florea Gheorghita**	*Institutul de Cercetari pentru ingineria Mediului*
30	**Codreanu Matei**	*Institutul de Studii si Proiectari Pentru Ingineria Mediului*
31	**Ionescu Cornelia**	*AQUAPROIECT*
32	**Victor Ianuli**	*Universitatea Tehnica de Constructii Bucuresti*
33	**Gabriela Alexan**	*Gestionnaire Sans Frontiers*
34	**Viorel Lascu**	*Regional Center for Ecological Survey*
35	**Irina Popescu**	*Regia Autonoma ‘’ Apele Romane’’ - Constanta*
36	**Zoltan Hajdu**	*Focus Eco Center*
37	**David Csaba**	*Focus Eco Center*
38	**Petruta Moisi**	*Center for Ecological Consultation - Galati*
39	**Roxana Schiopu**	*The Ecologist Youth of Romania*
40	**Ioan Hantulescu**	*Albamont*

Evaluation of the Workshop

Organization	Method	Results	Proposals
• Excellent	• Too complicated	• They can be anticipated by an expert	• The time was too short, the course was tiring
• Excellent	• The process should be repeated on other occasions as well, so that the participants can get familiar with it	• Satisfactory, I have expected much more	• More explicit presentation of the way we should approach the method
• Very good	• Good, but the method Aquarius a standard form and it is not well sized related with the scheduler	• Very good	• I expect other occasions for using TOPP method
• Exceptional	• Good	• Very good	• 1. Approach of 4 days and a half • 2. Should be announced earlier • 3. Updated official reports on sectors should have been of much use
• Good	• Good	• Well	• Facilitators should have had much more indulgence & diplomacy
• Good	• Very Good	• Good	• Good
• Good	• Excellent	• Exactly what I expected (good & very good)	• The program is too loaded (observance the agenda) • The period of the workshop – too short – it should have been extended to 6 days
• Good, but it took the 2 programme managers too much time to agree on certain aspects	• Very Good	• Average sufficient	• Some relevant examples (provided) should have been handed over before the workshop

• Good	• Interesting because as far as I understand it could be applied in various fields of activities	• Highly efficient	• No proposals
• Well	• Complicated & with minimum efficiency	• Good	• Increased incentives • Appraisal of the Romanian team
• Very good	• Adequate	• Real logical	• The time was too short for the analysis of general problems of environment • The participants should be mainly from EPAS
• Good	• Comprehensible in a short period of time	• Very good	• The environmental experts should have been involved in this type of workshop from the very beginning of method
• Good	• Logical, efficient	• Very good	• Elimination of the spirit of tough competition when working is a team
• Satisfactory	• Excellent	• Satisfactory in a very short time	• A longer period of the time of workshop • Concrete projects and section up of priorities should have been in the center of the interest
• There are multiple possibilities of	• Very, very good	• Satisfactory	•
• Good	• Very good	• Satisfactory taking in consideration the proposal of project	•
•	• Good	•	•
•	• Good	•	•